RAILROAD GAZETTE

FRIDAY, JUNE 6.

CONTENTS.

	Page.
ILLUSTRATIONS:	
The Use and Abuse of the Janney Coupler	390
The New Westinghouse Shops,	391, 393
Photographic Record of Broken Couplers—Chicago, Burlington & Quincy R. R.	394
Gold's Auxiliary Steam Drum for Car Heating	396
The Robert Eastwick Car Coupler No. 2	397
Valve Surfacer	397
A Novel Valve	398
The Synchronization of Clocks at a Distance	398
Experimental Tie Plates—Pennsylvania R. R.	399
CONTRIBUTIONS:	
The New England Railroad Club and the M. C. B. Coupler	389
EDITORIALS:	
The Master Car Builders' Association	400
Master Car Builders' Coupler Breakage	400
EDITORIALS:	
Red and Green Tail Lights	401
A Misleading Quotation	401
The Canadian Pacific Report	401
EDITORIAL NOTES	400, 402
NEW PUBLICATIONS	402
TRADE CATALOGUES	403
GENERAL NEWS:	
Technical	403
The Scrap Heap	399
Locomotive Building	404
Car Building	404
Bridge Building	404
Meetings and Announcements	404
Personal	405
Elections and Appointments	405
Railroad Construction	406
General Railroad News	408
Traffic	408
MISCELLANEOUS:	
American Practice in Block Signaling	392
The Mortor "Heat Storage System of Car Heating	398
Dunkirk Engineering Works	398

Contributions.

The New England Railroad Club and the M. C. B. Coupler.

The McConway & Torley Co.,
PITTSBURGH, Pa, May 17, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following correspondence requires little, if any, comment from us. We present it for publication as the most direct method of throwing some light on the statements made at the meeting of the New England Railroad Club March 12 last on the subject of breakages of "M. C. B." or "Janney Type" couplers.

A single fact will serve to indicate the spirit which must have prompted the statements made at that meeting. On Nov. 21, 1889, there were shipped to the Boston & Albany R. R., care of F. D. Adams, Allston, Mass., 12 Janney knuckles, presumably for repairs. On April 24, 1890, there still remained in the repair shed at Allston (counted by the writer) 5 knuckles out of the 12 referred to above, so that in a period of five months Mr. Adams, who reports an average breakage of 119 knuckles per month (595 for five months), maintained repairs on that enormous basis with seven knuckles.

WM. MCCONWAY, President.

PITTSBURGH, Pa., March 15, 1890.

F. D. ADAMS, Esq., M. C. B., Boston & Albany R. R., Allston, Mass.:

DEAR SIR: The enclosed clipping has been sent to us by a correspondent who does not, however, give us the name of the newspaper from which it is taken.

We are very much interested in the paragraph which we have marked with a blue pencil on the clipping, in which you are quoted as saying: "In 60 days this last season 337 broken Janney couplers were reported on his (your) road, and it was considered an enormous breakage, considering the total number of Janney couplers that were run over the road during that time."

The number of breakages, if the same applies to the Janney coupler, is so extraordinary that it would require our especial attention; but we do not care to institute an investigation until we can assure ourselves that you have been correctly reported. Will you kindly advise me if this is the case.

Very respectfully,
(Signed) WM. MCCONWAY, President.

Boston & Albany Railroad Co.,
Office of General Master Car Builder,
ALLSTON, Mass., March 18, 1890.

MCCONWAY & TORLEY CO.:

GENT: In answer to yours of the 15th in regard to my statement that we had broken in 60 days 337 Janney couplers, I did not say we had broken so many Janney couplers, but that we had broken on our road in 60 days 337 couplers of the Janney type, and I say it again. The record was carefully taken, and this was the report. I say this is an enormous breakage considering the small number of cars that came to us equipped with this type of coupler.

Yours,
(Signed) F. D. ADAMS.

PITTSBURGH, Pa., March 26, 1890.

F. D. ADAMS, ESQ., ETC.:

MY DEAR SIR.—I beg to acknowledge receipt of yours of the 18th inst., which has been duly considered.

I found from the report of the meeting of the New England Railroad Club, as published in the technical papers, that you had been misquoted in the newspaper, the clipping from which I sent you.

I quite agree with you that a breakage of 337 couplers in 60 days is an enormous one considering the small number of cars that you receive which are equipped with the Janney type of coupler. The point, however, which interests us most in connection with this subject is not to ascertain how many couplers of the Janney *type* were broken, but how many *Janney couplers* were broken and included in the 337. . . . We hold ourselves responsible within the limits already explained in our letters of Oct. 20 and March 15 for any breakages of the Janney coupler, and we will therefore be under obligations to you if you will cull out from your reports the number of Janney couplers included therein. If your reports will enable you to indicate the character of the breakages on the blanks which we inclose herewith you will add to the obligation under which you will place us by sketching each breakage for our use.

We have had no reason to expect a very heavy return of breakages from your line, as we find that the total amount of material furnished you, upon requisitions for repairs of Janney couplers, is only 12 knuckles.

In addition to the favor which we ask above we again beg that you will accept our proposition of Oct. 20, 1889, at which time we wrote you "if you have any broken Janney freight couplers or wrought iron knuckles in your scrap heap we should be very glad to have you avail yourself of the foregoing proposition and send them to us for test and replacement as proposed."

Very respectfully,
(Signed) WM. MCCONWAY, President.

ALLSTON, Mass., March 28, 1890.

THE MCCONWAY & TORLEY CO., ETC.:

I do not wish to continue any controversy or correspondence in regard to the question, as we should never agree, consequently I prefer to let this be the end of it. I will say to you that in the record of breakage we find of the Janney 58 bars broken, and besides these 238 knuckles broken. The fact that you are not notified is no proof that hundreds of your knuckles are [not] broken on roads that have no correspondence with you in regard to it. I have no doubt others do as we do, make a pattern and get them made at some place where steel castings are made—this is what we do—so that the record that is published in the railway papers are not worth anything only to mislead the managers of roads.

Yours, (Signed) F. D. ADAMS.

PITTSBURGH, Pa., May 10, 1890.

F. D. ADAMS, Esq., Etc.:

DEAR SIR: Upon receipt of yours of March 28, in reply to ours of 26th, we set about making an investigation for the purpose of determining the nature of the foundation upon which were based the statements, concerning breakages of Janney couplers, contained in the paper which you read before the New England Railroad Club, at the March meeting.

The statements made in that paper can be construed only to mean that on the Boston & Albany Railroad you had actually broken 296 Janney couplers and knuckles in the ordinary course of handling cars, and, incidentally, that these cars had been delivered to the Boston & Albany Railroad in good order.

Since the publication of that paper the writer has made a personal investigation on the line of the Boston & Albany Railroad, with a view to getting by observation, if possible, the information which you declined to give. The facts as they appear to him are, that you have caused a record to be taken of the *condition* of couplers on cars passing over your road during a period of two months, that this record notes defects of any character whatever, as, for instance, a crack or a chip out of a coupler or knuckle; that this cracking or chipping did not necessarily occur on your line, nor did it in any way disable the coupler or render it unsafe, and further, that few, if any, of the breakages or defects were repaired by you, your company not being responsible for them because not actually causing the damage.

You have published widely a statement that was meant to convey to those who read it that the number of Janney couplers specified in that report was actually broken by your employés on the line of your road and, by implication, that your company was put to the expense of that number of renewals.

It is our purpose to publish, equally as widely, the true facts, as they seem to us; but, as that publication will necessarily call into question your good faith and veracity, we deem it but just that you be notified of our intention, to the end that you may have opportunity to deny the correctness of our conclusions before that publication.

In conclusion, with reference further to your letter of March 28, we beg to remind you that you cannot make a public statement affecting private interests, as you did at the March meeting, and successfully dismiss the further consideration of the subject by a captious declaration "that you do not wish to continue the controversy."

Very Respectfully,
(Signed) WM. MCCONWAY, President.

The Morgan Engineering Works.

Those who take pleasure in examining a modern high class engineering establishment will do well to visit the Morgan Engineering Works, of Alliance, O. The most improved facilities for handling all classes of material are used, and the shop system permits business to be carried on with little of the disagreeable interruptions so disastrous in badly arranged shops. To facilitate the management, a central telephone system is being introduced in such a way that any foreman can speak with any other foreman or with the main office without leaving his department, call bells being placed at several convenient points in each shop. In the tool room is an annunciator system arranged in such a way that a workman can obtain tools without leaving his work. Standard gauges are used for all work and are compared frequently with permanent standards kept in glass cases in the tool room.

One of the most interesting changes going on in this shop is the concentration of boiler and engine power. A new boiler house and a stack 125 ft. high, are to be built, and in this building will be placed all the boilers. It will be adjacent to a new engine room, which will contain all of the engines, the power being transmitted by means of electricity, which will drive motors at various points. Little or no shafting will be used.

This concern purchases nearly all of its machine tools, only a few special ones being made at the shops. Among the tools noticed are machines from all of the prominent makers.

The capacity of the shops is about 20 tons of machinery per day. This is based on the output of last year. They are now building three overhead traveling cranes for the Dixon Manufacturing Company, to be used for a new foundry. Two of these are 25 ton, and one of 10 ton capacity with a 57½ ft. span, the power being conveyed to the crane by a square shaft. They are also building a 20-ton crane, 58 ft. span, for the Lackawanna Iron & Coal Co., and a 50-ft. 30-ton overhead crane for the Illinois Steel Co. for a new plate mill at South Chicago. They have just completed one 78-ft. 25-ton crane of the same pattern over the rail train at the same mill, two overhead cranes for the Pennsylvania Railroad shops at Altoona, driven by electricity, four traveling cranes for the Niles Tool Works, 20 tons capacity, two of which are 50 ft. span and two 30 ft.; and two 35 ft. cranes for the Watervliet Arsenal, Troy, New York. These cranes have a travel of 562 ft., and are of 50 ft. span. The square shaft which drives these cranes is 562 ft. long and weighs 15 tons. A 10-ton traveling crane for Russell & Co., manufacturers of agricultural machinery at Massillon, O., has lately been finished. The span is 37 ft., and the power is derived from a square shaft. Also there are being made three large plate mill shears for cutting plates 120 in. wide, and 12 hydraulic jib cranes 10 tons capacity; also a hammer weighing 800 tons, and a 120-ton traveling crane, with overhanging jib, 52 ft. span, to operate with this steam hammer. Probably the most interesting tool now building at this shop is a crane of 150 tons capacity for the U. S. Government. There are also building four 35-ton hydraulic ingot cranes and two 50-ton ladle cranes with automatic motion.

The 150-ton crane has been two years under construction. The span is 62 ft. from centre to centre, with a cross travel of 44 ft. and a longitudinal movement of 112 ft., having a clear lift from the floor of 41 ft. It is just finished, and has been erected and put in position at these shops for exhibition. It has six changes of speed for hoisting and two for travel, as well as two changes for trolley travel. The Morgan Engineering Works are entirely responsible for this crane. They accepted the contract under rigid specifications which others refused to accept. It will be erected in the 16-inch gun shop of the United States Navy Yard at Washington. The size of this undertaking may be appreciated from the number of drawings, of which there are 85 sheets, 42 × 27 in. It will require about 14 cars to ship the entire crane.

The offices of this company are among the finest in this country. About 26 draughtsmen are employed, working under conditions with regard to light and ventilation that are unexcelled anywhere. The drawings are made in pencil and traced on parchment paper, from which blue prints are made, the tracing being filed away in drawers provided for that purpose. The arrangement of the wardrobes and lavatories connected with these drawing rooms is worthy of emulation. Each man has his individual box, as is customary in most gymnasiums. Nearly all of the draughtsmen are apprentices from the shops, and the officers say that the most satisfactory results are got from the encouragement of all young men at their works.

The shops are lighted by the electric arc light, and about 600 men are kept constantly employed. The enormous number of patterns made here can best be appreciated from the statement that 75 pattern makers are employed continually and that five large pattern store houses are found necessary. In these store houses there is a system of changing patterns and an arrangement of shelves and numbers which facilitate materially the foundry work. All the patterns ready for the foundry are placed in a large room by themselves, from which the foundryman selects according to his needs, which saves an enormous amount of time and considerably cheapens the work, because in that way castings of the same character can be made at the same time and suitable iron procured. Three new pattern shops of brick are now to be built. No one is allowed to enter these shops after dark, and if any one is found in there with a light of any sort it is sufficient cause for a dismissal. The foundry is 350 ft. long by 60 ft. wide, with wings in addition, and contains two electric traveling cranes. The fans and elevators are also driven by electricity.

In the new dynamo room will be eight large dynamos which will drive motors of about 200 horse power in the aggregate. A new erecting shop 350 ft. long is soon to be built. In the machine and erecting shops are four traveling cranes, three of which are driven by electricity. One of the shops is now driven by a 20 horse power motor in a very satisfactory manner.

Among other things now being made here is an anvil weighing 360 tons. It is made in nine sections of 40 tons each, dovetailed together and clamped. There is also a cast steel ram weighing 35 tons for a hammer which weighs 860 tons. Recently constructed is a hydraulic steel shear for the Homestead Steel Works, which cuts ingots 42 × 23 in. when at a dull red heat. The hydraulic pressure used with the shear is 5,000 lbs. per sq. in., and the total pressure 180 tons. The head of the machine is held down by bolts 16 in. in diameter. For the same works recently constructed are three plate mill shears having 11-ft. blades, the machines weighing 160 tons each.

Steel and mitis castings and phosphor bronze are largely used in the construction of all machinery. The dynamos are driven directly from the engine by means of a very satisfactory friction pulley consisting of a rubber band arranged on the smaller pulley which can be forced against the driving wheel of the stationary engine.

The policy of Mr. T. R. Morgan, Sr., the founder of these works, and also founder of the Solid Steel Works adjacent thereto, is to bring up around him a class of young men who can take from his shoulders the load of responsibility and carry on under his supervision the business which he has started. Four of his sons are already at work in the shops superintending the work. One is a chief draughtsman, and another an electrician. They have all received a good education and have been fitted for the positions which they occupy. Another son, not

yet graduated, is to enter the same business, filling a position for which he is being educated. Other young men who have served their term in the shops are rising through the drawing rooms and test departments to positions of prominence, either here or in other establishments of like character.

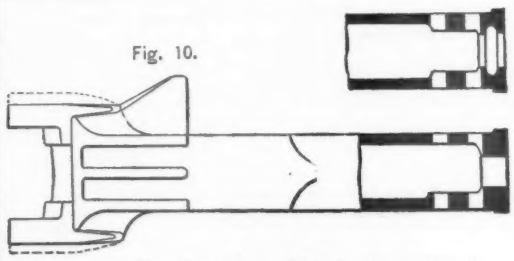
The Evolution of the Janney Coupler.

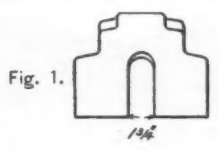
The engravings which accompany this show some of the changes which have gradually been made in the pattern of the Janney coupler, and illustrate some of the reasons for making them. These progressive changes, which have been indicated by experience in use, have affected principally the knuckle.

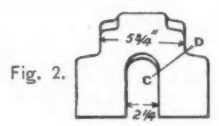
Fig. 1 shows the wrought iron knuckle in its original form as made in 1885 and 1886. The slot for the links measures 1¾ in. in width. This width of slot was found to be insufficient, principally because it was too small to admit the end of the pilot bar when an engine was coupled to a car equipped with the Janney coupler. As a result, the bar was driven in like a wedge and split the knuckle.

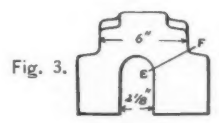
The slot was increased in width to 2¼ in., as shown in fig. 2, but this resulted in weakening the section on *C D* to such an extent that knuckles were liable to distortion from blows received in yard work, rendering them unfit for use. The knuckle in this form has not been supplied by the Janney Co. since early in 1888. It was followed by the form shown in fig. 3. It will be seen that the slot was narrowed ⅛ in., making it 2⅛ in., and that it is slightly out of the centre, making the upper lug thicker than the lower. The hub is also increased in thickness from 5¼ in. to 6 in. The object of these changes was to give an increased sectional area at the point where the fractures and bending had occurred. The relative sectional area *C D* and *E F* is shown graphically in the illustration. By measurement the area on *C D* is 5.44 sq. in.; on *E F* it is 7.50 sq. in.

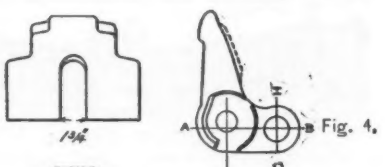
Fig. 10.

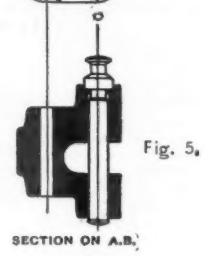












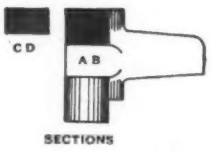


Fig. 4 a dotted line shows where metal has been added to the arm of the knuckle in the knuckle stamped "model of 1890," which is now furnished by the makers. This was added at the desire of various customers, who thought that additional strength was required in that part of the knuckle.

There is a widespread belief, which until quite recently has been shared by the manufacturers of the Janney coupler, that coupler failures have been much more largely due to blows than to pulling strains. The makers have recently modified their opinion on this matter as a result of careful study of actual failures of knuckles. An examination of 2,000 fractures of different knuckles shows only 25 per cent. traceable to blows. When a knuckle breaks by reason of a direct blow it breaks almost invariably on the line *E F*. In reports recently published the term "upper or lower lug off" has included those broken on this line, and also those broken through a line corresponding more or less closely with *G H*, fig. 4. In this class many breakages are included. The causes of breakages of this sort are illustrated in figs. 6, 7, 8 and 9, which are made directly from actual examples of broken knuckles. In these cases it will be seen that the fracture obviously occurred in pulling, and it is quite certain that in each case it resulted from a short or a bent pin. If a pin is bent it will not go down to engage properly in the lower lug. This is illustrated in fig. 8, where a crooked pin is shown which goes down far enough for the point to just engage the lower lug. When a pulling strain is brought on the pin, the point chips out a piece from the upper part of the lower lug. The fracture of the upper lug, as shown in this example, will, sooner or later, follow.

In figs. 6 and 7 is shown what happens when the pin is so far bent or is so short that it does not engage at all in the hole in the lower lug. Fig. 9 shows an example in which probably the lower lug was first broken, as in the case of fig. 8, and then the upper lug was broken by reason of the short pin, which is shown still in place in the upper lug. Both figs. 7 and 9 show the broken pins which were in the knuckles at the time the last fracture of these knuckles took place. From these examples it will be easily seen how, when a knuckle has been weakened by the chipping away of a portion by a bent pin, a second and totally destructive fracture will occur across *G H*, in case a car is being hauled with the knuckle not locked.

To obviate breakages of this class the company has devised the plan shown in fig. 5. This plan is to furnish with the coupler a pin 1⅛ in. diameter, made of high carbon steel, which will not bend under any legitimate strain, and which cannot be removed from the knuckle. The use of this pin will insure a full bearing in both lugs of the knuckle, and so prevent the successive chipping out of the pieces, as shown in the examples which we have considered. It will be seen that the pin is slightly enlarged at the lower end to prevent its being entirely withdrawn. It is also made with a neck near the upper end to prevent wearing away of the engaging shoulder, in the upper lug, while in use. The material and the diameter of this pin were arrived at after considerable investigation. In the table which accompanies this are given the results of bending tests of iron pins and also of steel pins of different carbons. The deflections given under the various weights are the extreme deflections measured on the machine and not the permanent sets. It will be observed that the 1⅛-in. pin of 75 carbon steel deflected less under 28,000 lbs. than the best iron pin under 13,000 lbs., and the company uses steel of this character. The distance between supports in these tests was 8 in.

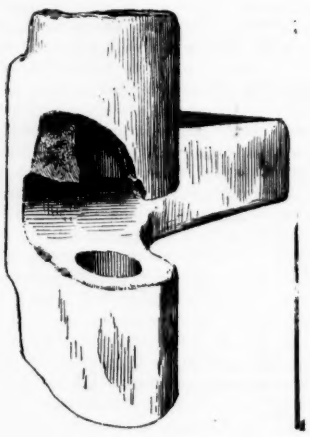


Fig. 6.

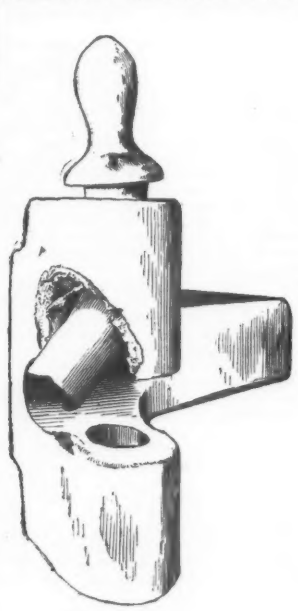


Fig. 7.

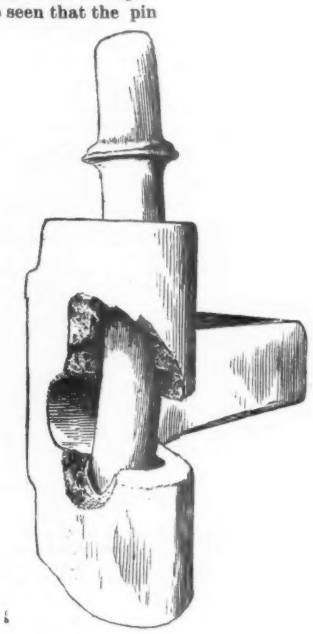


Fig. 8.

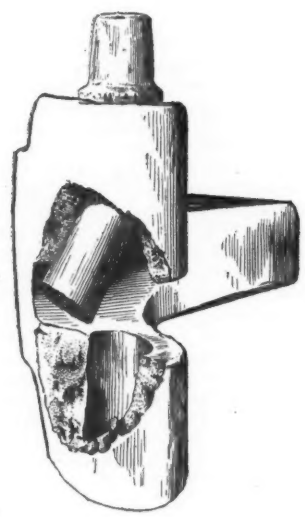


Fig. 9.

BENDING TESTS OF COUPLING PINS; DEFLECTIONS IN INCHES.

Pressure.	1⅛-in. diameter.						1⅜-in. diameter.		
	No. 1 iron.	No. 2 iron.	Steel 10 carbon.	Steel 32 carbon.	Steel 58 carbon.	Steel 75 carbon.	Steel carbon 75.	Steel carbon 75.	Steel carbon 75.
Lbs.									
5000	.01	.02	.01	.02	.02	.02	.02	.02	.....
6000	.03	.03	.02	.03	.02	.02	.025	.03	.....
7000	.07	.04	.02	.03	.02	.025	.03	.03	.....
8000	.11	.05	.025	.03	.025	.03	.03	.035	.....
9000	.15	.08	.03	.035	.03	.03	.035	.04	.....
10000	.20	.13	.04	.04	.03	.03	.04	.0425	.....
11000	.....	.16	.055	.045	.03	.035	.0475	.05	.....
12000	.....	.19	.095	.06	.04	.04	.055	.06	.....
13000	.....	.24	.15	.065	.04	.04	.07	.075	.....
14000	.....	.....	.20	.07	.05	.045	.085	.095	.....
15000	.....	.....	.....	.10	.05	.05	.11	.11	.11
16000	.....	.....	.....	.12	.06	.055	.13	.13	.13
17000	.....	.....	.....	.15	.065	.06	.14	.14	.15
18000	.....	.....	.....	.19	.075	.075	.16	.17	.16
19000	.....	.....	.....	.21	.085	.075	.20	.18	.17
20000	.....	.....	.....	.....	.09	.10	.....	.....	.21
21000	.....	.....	.....	.....	.10	.105	.....	.....	.23
22000	.....	.....	.....	.....	.12	.135	.....	.....	.255
23000	.....	.....	.....	.....	.13	.155	.....	.....	.28
24000	.....	.....	.....	.....	.14	.17	.....	.....	.30
25000	.....	.....	.....	.....	.16	.18	.....	.....	.31
26000	.....	.....	.....	.....	.17	.195	.....	.....	.34
27000	.....	.....	.....	.....	.19	.21	.....	.....	.35
28000	.....	.....	.....	.....	Broke.	.23	.....	.....	.....

Some changes have been made from time to time in the body of the coupler. It has been strengthened generally from end to end, and some modification has been made in the tail of the coupler, as shown by the two sections, fig. 10. Altogether the most important modification is in the lugs, as shown by dotted lines in fig. 10. The solid lines show the original pattern. In this pattern about six upper lugs were broken to one of the lower. The upper lug was then strengthened as shown by the dotted lines and the lower one left of its original thickness. The relative proportion of breakages was then changed, and there were about twice as many lower lugs broken as upper ones. The lower lug was then strengthened to correspond with the upper. In this form the patterns now stand.

The reason why the upper lug must necessarily be stronger than the lower, both in the coupler and the knuckle, to resist buffing shocks is quite obvious. The coupler naturally droops, and this, added to the camber of the car, will cause the first shock of buffing to come on the upper lug.

One moral of this is that the observations of breakages of the older patterns of couplers are by no means conclusive as to the endurance of the latest form. Another moral is that until the link and pin is entirely eliminated we can get no really accurate measure of the cost of maintenance of the M. C. B. type of coupler. The breakages, especially of knuckles, must be very much above the normal so long as they are coupled with the old style of pins, and, as everybody now knows, the knuckle fractures are about twice as great as the fractures of the body of the coupler. In a report which appears in this issue, of coupler breakages on the C., B. & Q., will be found an interesting analysis of couple failures which brings out these points very conclusively.

The Iron Trades.

The English Iron Trade.—The British iron market is very much depressed. Scotch warrants which were, at the end of the year, selling at 65s. 6d. are now sold at 44s. 6d. Some furnaces have been damped down, others, it is reported, will be blown out; the prices of coal and coke

are being rapidly reduced. In spite of the second "stop week," closing nearly all of the tin plate mills, the price is reduced 3d. per box. There is a falling off in the demand for skilled labor and the English trade journals have a panicky tone. There seems no reason for this, except the almost total cessation of orders for new ships. The total exports of iron and steel from the United Kingdom for the past three years and for the first four months of this year have been, with their values:

	Tons Exported.	Value.
1887	4,143,028	£24,992,314
1888	3,995,563	26,416,636
1889	4,183,388	29,153,101
1890 (4 months)	1,250,284	10,106,290

The exportations for the first third of the year have decreased 2.2 per cent. in quantity, but increased 13.1 per cent. in value; and it will be noticed that the value of the exports for 1889 increased over 10 per cent. on those of 1888. Comparing the months of April in the two years, there was an increase in value of 10.4 per cent., though the quantity exported decreased 6.8 per cent. Nor, except in the financial troubles in the Argentine Republic, does there seem cause for fear of any marked reduction of consumption, as for nearly two years our takings of British iron and steel, excepting tin plates, have been too small for any proposed fiscal legislation, or possible overproduction, to have much influence; and in tin plates sold to us last year the gross weight of the finished iron concerned was probably about 320,000 tons, or only about 8 per cent. of their exports in quantity, though in value it amounts to about 14 per cent.

The price of iron, not only in England, but in all countries which draw on her for any large proportions of this supply, was undoubtedly unduly inflated by the efforts of speculators, but as for the five years, 1884 to 1888, the average price for any year was not above 42s. 3d. and the minimum price was 37s. 1d., it seems that the price is not now unduly depressed and those ironmasters who blow out their furnaces in the face of decreasing prices of raw materials will make a mistake.

Exportation to this country has either noticeably decreased in quantity or remained stationary except under the heading "Steam engines and parts thereof," where the value has increased from £14,382 to £22,169 for the four months. In tin plates the decrease in quantity has been about 30 per cent. In the reports of pig iron for April the quantities were: 1889, 10 341; 1890, 10,303; but the values were £34,591 and £72,033, showing an increased proportion of special irons like ferro-manganese and high priced softeners.

Our Probable Pig Iron Production.—Comparing the capacities of the furnaces in blast on the first of the months of this year, we have apparently made 3,077,000 tons up to May 1. This means, if the *American Manufacturer* has compiled its return with the usual care, and no adverse circumstances occur, an output of nine million gross tons for the year.

The probable quantities made for the first third of the three past years, with the percentage of the total make for the years is given below:

	Probable production for 1st third of year.	Percentage of total make for year.
1888	2,116,591 gross tons.	32.6
1889	2,365,371 " "	31.1
1890	3,077,035 " "	

If we increase our production through this year as we did the last, more than nine million tons will be made. Prices, however, are about down to where they were in May last year, and the weekly capacity of furnaces in blast has fallen from April 1 to May 1 by 6,700 tons, or about 3½ per cent., which is about the same rate of decline as during the same period last year. The increase of probable production for this year over last is about 30 per cent., and of this year over 1888 more than 13 per cent. Our apparent production for first third of the year has exceeded the total production of any year before 1880. This is a very rapid development, and is probably without precedent in the history of the iron trade of any country.

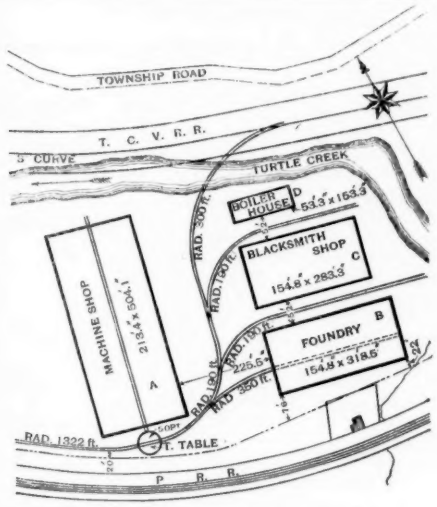


Fig. 1.—General Plan, Westinghouse Shops

The New Westinghouse Shops.

In the *Railroad Gazette*, April 11, 1890, we gave a general description of the new Westinghouse machine shops at Wilmerding, Pa. That description will give to the reader a general idea of the location and surroundings. Herewith are drawings which will give further information and illustrate the design of the buildings and their location relative to each other.

In fig. 1 is shown the plan of the works, and the tracks leading to and from the buildings. A new railroad station is to be built on the Pennsylvania Railroad on the site of the old one shown on the plan. The tracks leading to the different shops are standard gauge, and pass over a turn-table in front of the machine shop where cars are turned to pass into the first floor of that shop. Other tracks not shown are soon to be laid, the principal one of which will enter the foundry from the rear by a switch-back.

The dimensions of the various buildings are given on the plan. Some idea of the buildings can be obtained by inspection of the framing elevation shown in fig. 2, which shows one-half on the machine shop; the other half being exactly like that shown. There are two working floors. The floors are very substantial, but at the same time quite expensive. They are made of 8 in. plank set edgewise covered with the ordinary flooring, thus making a solid wood floor over 10 in. thick.

The floor girders are formed of plates and angles of the dimensions given. The posts are of Z iron put together in a form which can readily be painted. The iron work of all the buildings was constructed by Keystone Bridge Co., Pittsburgh, Pa. The designs of the girders and trusses are readily seen from the drawings.

The machine shop is well arranged, and the area available for tools is enormous, but all of it will not be occupied at present. The capacity of the tools put in will be about 500 sets of air-brake apparatus per day. The light is excellent, but is superior on the second floor. About two-thirds of the length of the machine shop on the centre line there is an opening 50 ft. wide in the second floor. The ground floor, directly under this well hole, is used for storage. Thus the store room is admirably lighted. Two hydraulic elevators run from one floor to the other.

One of the most interesting in this remarkable set of buildings is the foundry, which contains the best machinery of all kinds. A section of the building, showing the trusses, is given in fig. 3. These trusses have been

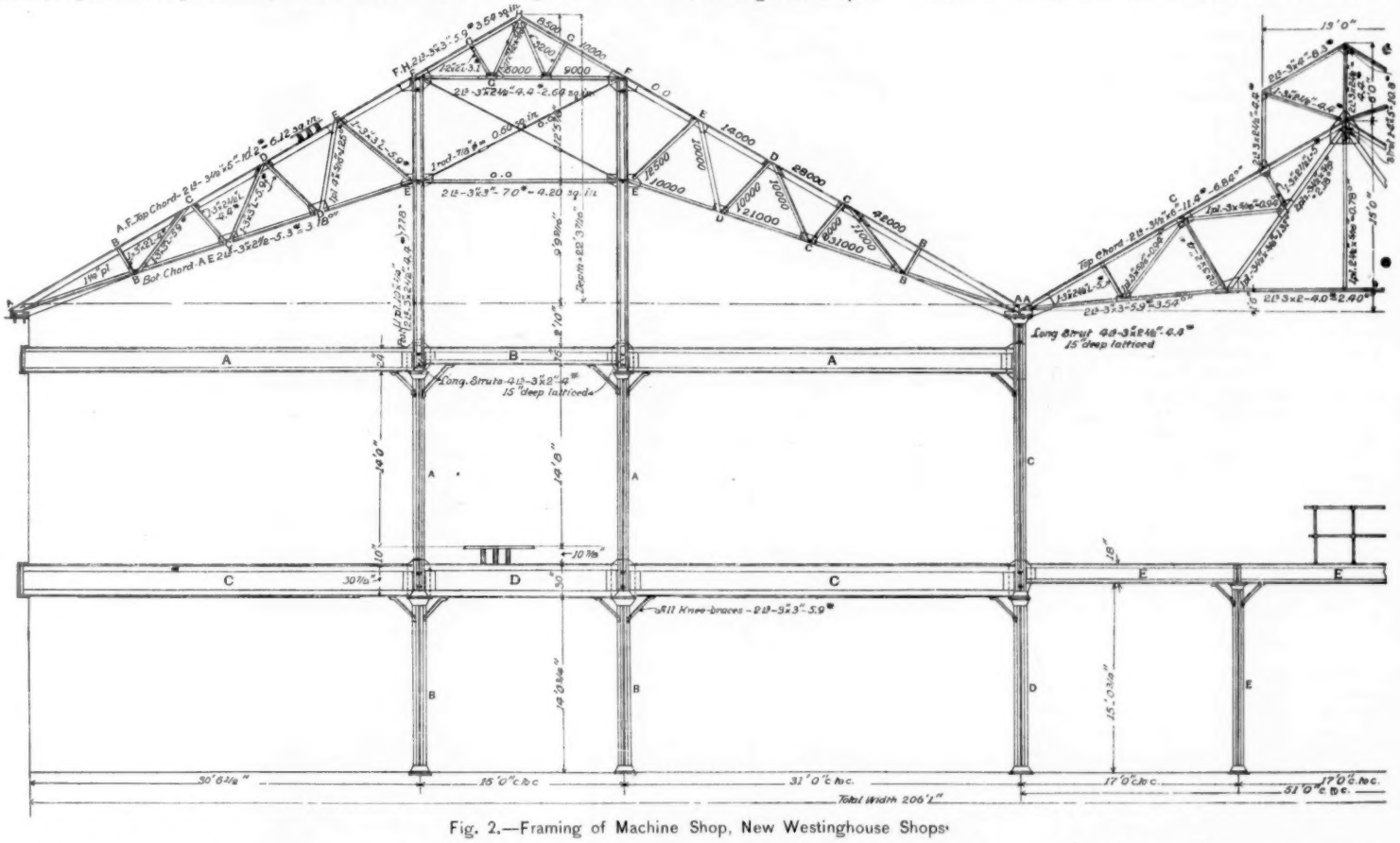

Long Strut 4 L's 3½ x 2½ x ⅜
15" deep latticed
Long. Struts 4 L's 3½ x 2½ x ⅜
15" deep latticed
All Knee-braces - 2 L's 5" x 3" x 5/8"
30'6⅛"
15'0" c. to c.
31'0" c. to c.
17'0" c. to c.
51'0" c. to c.
Total Width 206'1"

Fig. 2.—Framing of Machine Shop, New Westinghouse Shops.

devised especially for these buildings. In the centre of the foundry, lengthwise of the building, there is a charging floor, shown in fig. 4. The floor is carried from the main posts which hold the roof, and by an additional line of posts, as shown in fig. 4. The wind bracing in the roof is shown in fig. 5. That portion of the foundry which will most interest foundrymen is given in figs. 6 and 7. These show the traveling tables which carry the completed molds to the cupola to be filled and thence to the cleaning room to be broken open and the contents given to the rattlers.

The tables are constructed of flat plates of iron, *A*, sufficiently large to hold a completed mold mounted on trucks. At one end the wheel *B*¹ acts as an idler, simply to carry the tables and trucks. At the other end, however, the sprocket-wheel *B* is driven by a vertical shaft connecting by wire ropes and pulleys with stationary Westinghouse high speed engine located on a raised platform, where also are located the fans which furnish air for the cupola and the engines which drive them. The steadiness with which the traveling tables move can, perhaps, be illustrated in no better way than by stating that we have seen a bolt about 5 ins. long standing vertically on its head on the table make the complete circuit of a whole revolution without falling over.

Another interesting feature in this foundry is the sand conveyor, shown in plan, fig. 6, at *C*, placed over the molding machines. This conveyor brings the sand from the dryers directly to the point wanted, and automatically keeps up the supply.

In the end of the foundry at *D* are the rattlers, to which the castings are delivered when taken from a mold on the pouring table. Into the rattling room a full gauge track runs, and the castings, after being thoroughly cleaned, are conveyed on cars by means of these tracks to the different parts of the works.

One chain of tables, the cupolas, a sand conveyor and

hydraulic molding machines are shown in perspective in fig. 7. Details of the driving mechanism of the tables are given in figs. 8 and 9. The sand is brought up from the sand room by the conveyor and delivered by spouts, as shown in fig. 7. The molds are made and then placed on the nearest traveling table and moved around to the cupolas, where they are poured. Thence the molds travel to the sand room, where the sand is shaken out, sifted and returned to the conveyor. Meantime the castings pass on to the rattlers. The castings cool sufficiently to be taken out of the molds while traveling down the length of the foundry, but they came out of the rattlers and are ready to ship while still too warm to handle with comfort.

The hydraulic molding machines used with this plant are made by Alley & MacLellan, of Glasgow, Scotland. The Westinghouse Air Brake Co. owns the patents for the United States. The whole apparatus for molding and casting works very satisfactorily, and for a foundry of this kind, where a great number of pieces of the same patterns must be produced, it will doubtless be found more economical than anything heretofore used in the country.

American Practice in Block Signaling.

IV.

THE ELECTRO-PNEUMATIC TRACK-CIRCUIT SYSTEM.

The main difference between the apparatus of these signals and that of the clockwork signals is in the motive power. In the pneumatic system the signal is moved from safety to danger and vice versa by compressed air, which is supplied to the various signals by a pipe running alongside the track, a stationary steam engine or other power for compressing air being located at a central point where it can supply a number of signals. Pneumatic signals were used on the West Shore road in 1881, but the system there was abandoned because of faulty design and construction of details. When the time came for renewing the apparatus the prosperity of the railroad company had declined and no action was taken. This system is also in use on the Fitchburg road, and its operation there was described in the *Railroad Gazette* of June 15, 1888.

The latest form of pneumatic signal, however, is a semaphore, and full descriptions of the apparatus as made and used in this form were given in the *Railroad Gazette*, of Dec. 21, 1888, and Aug. 23 and Sept. 6, 1889. These improved signals are in use on the Pennsylvania road east of Pittsburgh, where 6 miles of four-track line have been operated for a year and a portion of it for six years. The officers of the road say that these signals have given them no trouble whatever. Seven miles of the four-track line of the New York Central & Hudson River, between 138th street and Woodlawn, New York City, are being equipped with this system, and it has just been put in use on 7 miles of the Central of Jersey.

This system, as operated at the places named, embraces important features not yet employed in any other automatic signals, and the plan is in many respects an ideal one. The signal is a semaphore. It is placed exactly at the entrance of a block, and therefore does not turn to safety in the face of the engineer. There is a distant signal for each home signal. Each block section is worked with a single circuit, and the distant signal is controlled by a wire circuit upon poles, thus eliminating some of the complications incident to the plan which has been employed to make the clockwork signals "overlapping."

It has been regarded as an important principle in

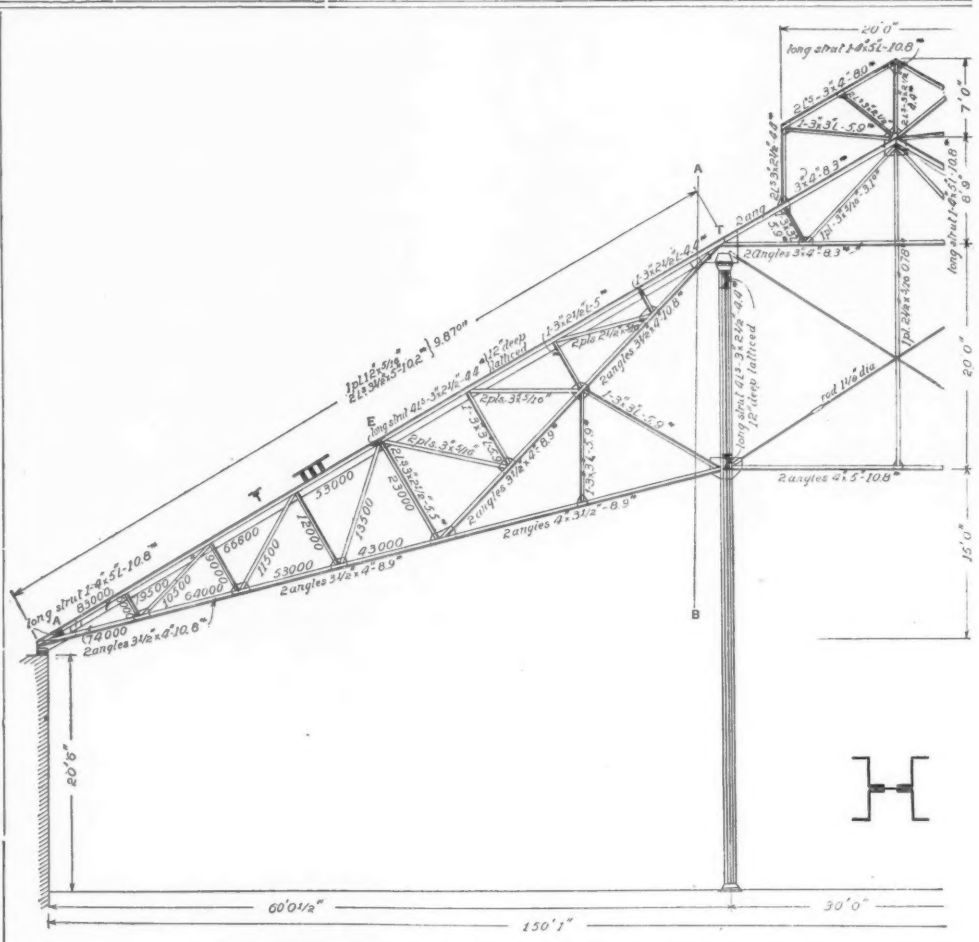


Fig. 3.—Framing of Foundry, Westinghouse Shops.

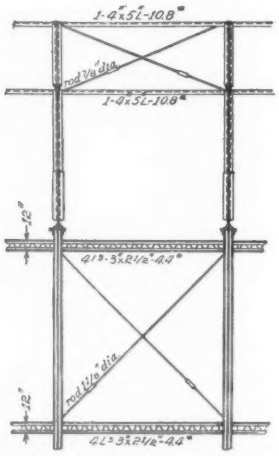


Fig. 5.—Section on A B.

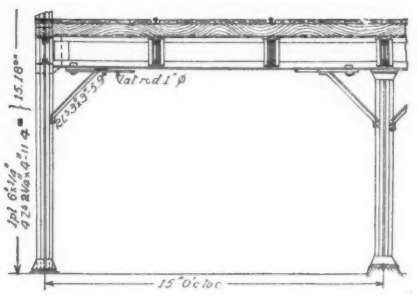


Fig. 4.—Charging Floor.

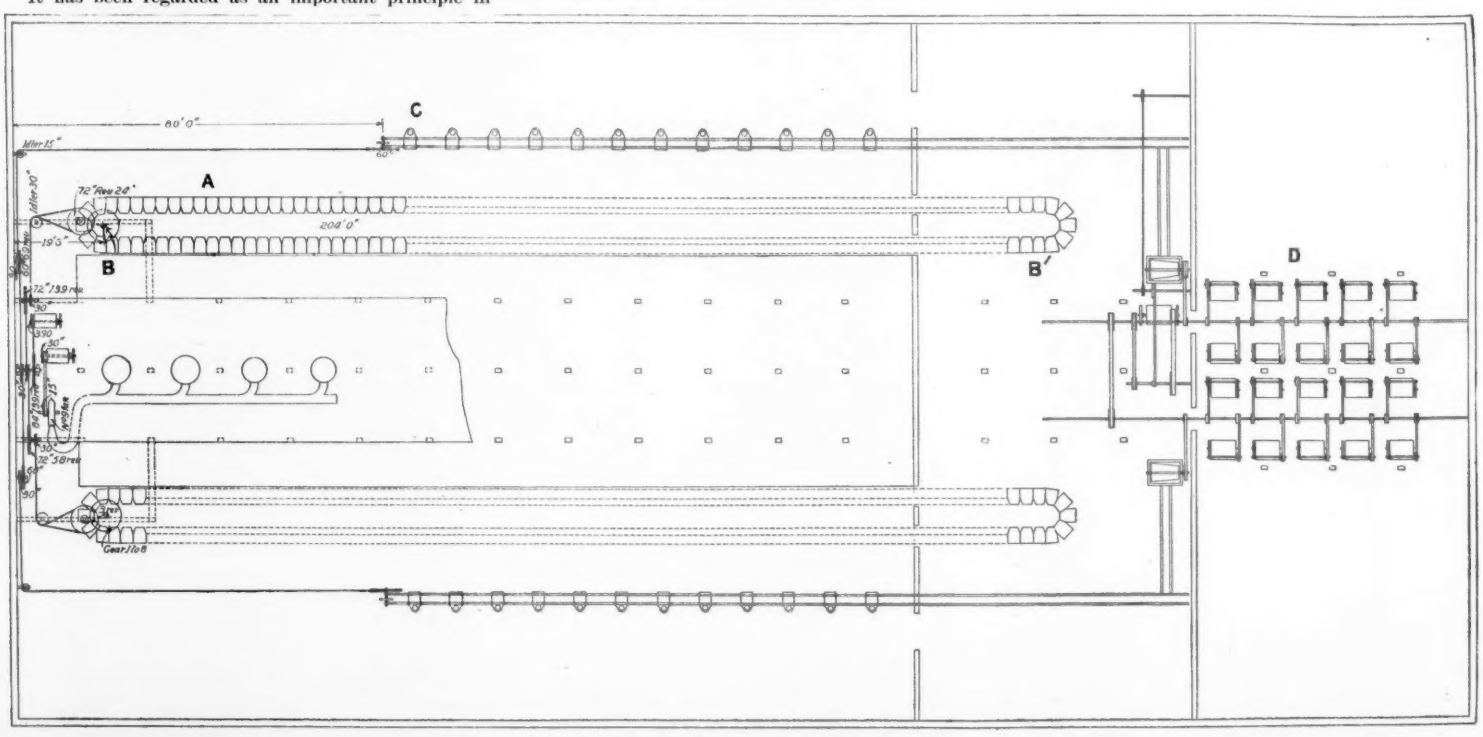


Fig. 6.—Plan View of Foundry, Westinghouse Shops.

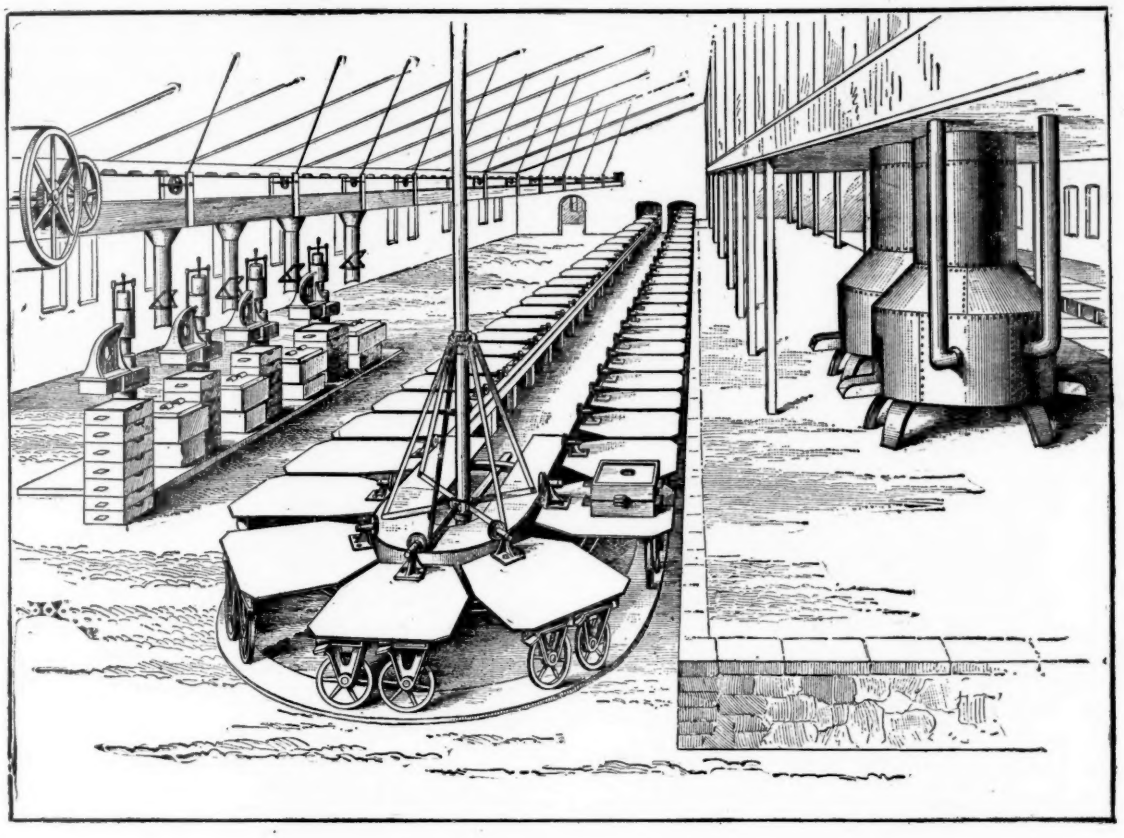


Fig. 7.—Perspective View of Foundry.

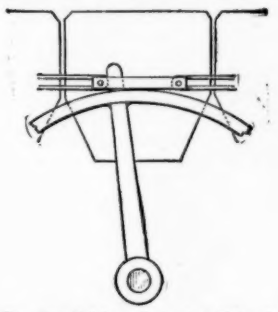


Fig. 8.—Driving Sprocket Wheel and Chain.

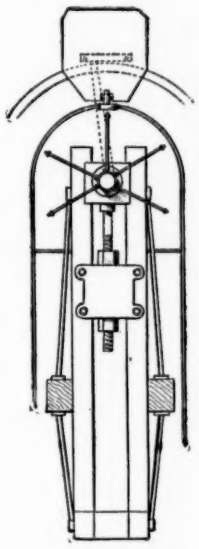


Fig. 9.—Plan of Idle Wheel at Upper End of Tables.

automatic signaling that the locomotive engineer should witness the operation of the signal as he passed it, thus having constant evidence that the signal is in working order. The location of the signal precisely at the entrance of the section, as is the case with the pneumatic signal on the Pennsylvania, makes this inconvenient, if not impossible, as it is hardly to be regarded as expedient, even if it were practicable, to require an engineer to turn around and look at a signal after he has passed it. By the enforcement of adequate discipline the brakemen of a train could, however, be utilized as monitors for this purpose; and we understand that something of this kind is done on the Pennsylvania. The adjustment of battery power at just the right quantity and intensity, and the adjustment of the armatures of the electro-magnet and other parts of the apparatus of track-circuit signals, have to be attended to with care, and the records of such signals in actual use show that lapses will sometimes occur in this respect. The worst consequence of such irregularities is generally a delay to trains, but they will sometimes cause a signal to stand at safety in spite of the entrance of a train to the section, and such a contingency at once becomes dangerous unless the engineer or, as just suggested, the brakeman, observes the failure and takes measures at once to secure the safety of the train. In fact, both these men should act. If a signal stands at safety, and fails to change when the train passes it, the engineer must, according to the rules, proceed cautiously; but by this reduction of speed the train loses time and the next following train may soon be too close upon it. If, on the arrival of this second train, the condition of the apparatus has undergone a change, so that the signal changes from safety to danger in the proper manner, the engineer, observing this movement, proceeds at full speed. A train should, therefore, be protected by hand signal whenever it enters a section, unless it is *known* that the signal indicates danger behind it.

The cost of erecting these signals, with the necessary apparatus for compressing and conveying the air, is rather high as compared with other systems, but the use of compressed air in place of manual power for the operation of switches and signals in yards, which is often highly advantageous, affords a means of dividing the expense, and the pneumatic block signals recently erected have been located near to and in connection with interlocking plants, thus reducing the cost as compared with a plant in which a compressing station would have to be provided for block signals alone.

The cost of a plant covering about eight miles of four-track road on the Central of New Jersey, which was erected this year, was about $40,000, and a similar plant on the New York Central, now under construction, is to cost about $60,000; but in both cases there are two or three interlocking machines included in these figures, so that the cost per mile or per block section for the automatic signals is less than would be indicated by the amounts named. The block sections on the Central of New Jersey average less than 2,500 ft. in length; those on the New York Central are somewhat longer. The latest statistics we have concerning the cost of maintenance of pneumatic block signals are those reported for the ten miles on the Fitchburg road in the article above referred to. The cost per signal per year there was $133, or approximately 50 per cent. more than that of maintaining clock-work signals. The cost of the erection of a building with steam engine, air reservoir, etc., which is approximately $10,000, and the running expenses of such a plant, account for an appreciable portion of this added cost.

THE HALL SIGNAL.

The Hall wire-circuit automatic block signal is the oldest automatic signal used to any extent in this country, and the instruments put up by Mr. Hall on 16 miles of the Eastern Railroad (now the Boston & Maine) in 1871 are still in use; but the company has recently been reorganized, after several years' silence, and the signal, as now offered, may be regarded as substantially a new device, the improvements over the old pattern being radical in some respects. The announcement of the new plans of the company was given in the *Railroad Gazette* on Jan. 24 last, and we expect to describe the signal in a future number. The signals are used extensively on the Hartford Division of the New York, New Haven & Hartford and on the Boston & Worcester Division of the Boston & Albany. The latter road is now equipping 33 miles of double track with continuous blocks.

The Hall Company makes no use of the track circuit, claiming that the adjustment of battery and of instruments is such a delicate operation that it cannot be made to give satisfactory service. The connection from one signal to another is by line wire upon poles, and passing trains actuate the signals by means of levers placed at right angles to the rails in such a position that the wheels depress one arm, and, by the elevation of the other, open or close an electric circuit. The signal is a disc of very light weight, inclosed within a wooden case in which is a circular opening covered with glass. This disk is attached to the armature of an electro-magnet in such a way that when the magnet is energized the disc is held up out of sight, and on the cessation of the current falls by gravity in front of the glass-covered opening. It is colored red, and the surrounding surface of the case is black, so that when visible it indicates danger. At night a light is placed back of the opening in the case, and indicates safety or danger, according as the disc is held up or is dropped, the disc being of red silk and translucent. The signal magnet in this system is operated directly by the primary circuit, no relay or other device for multiplying power being necessary. The current whose continuity is necessary to maintain the signal at "all clear" is, by the entrance of a train to the section, broken at two places, and one of these contacts is so broken that it cannot cannot be restored except by the action of the track instrument at the outgoing end of the section.

The merits claimed for the Hall signal over the track-circuit system are:

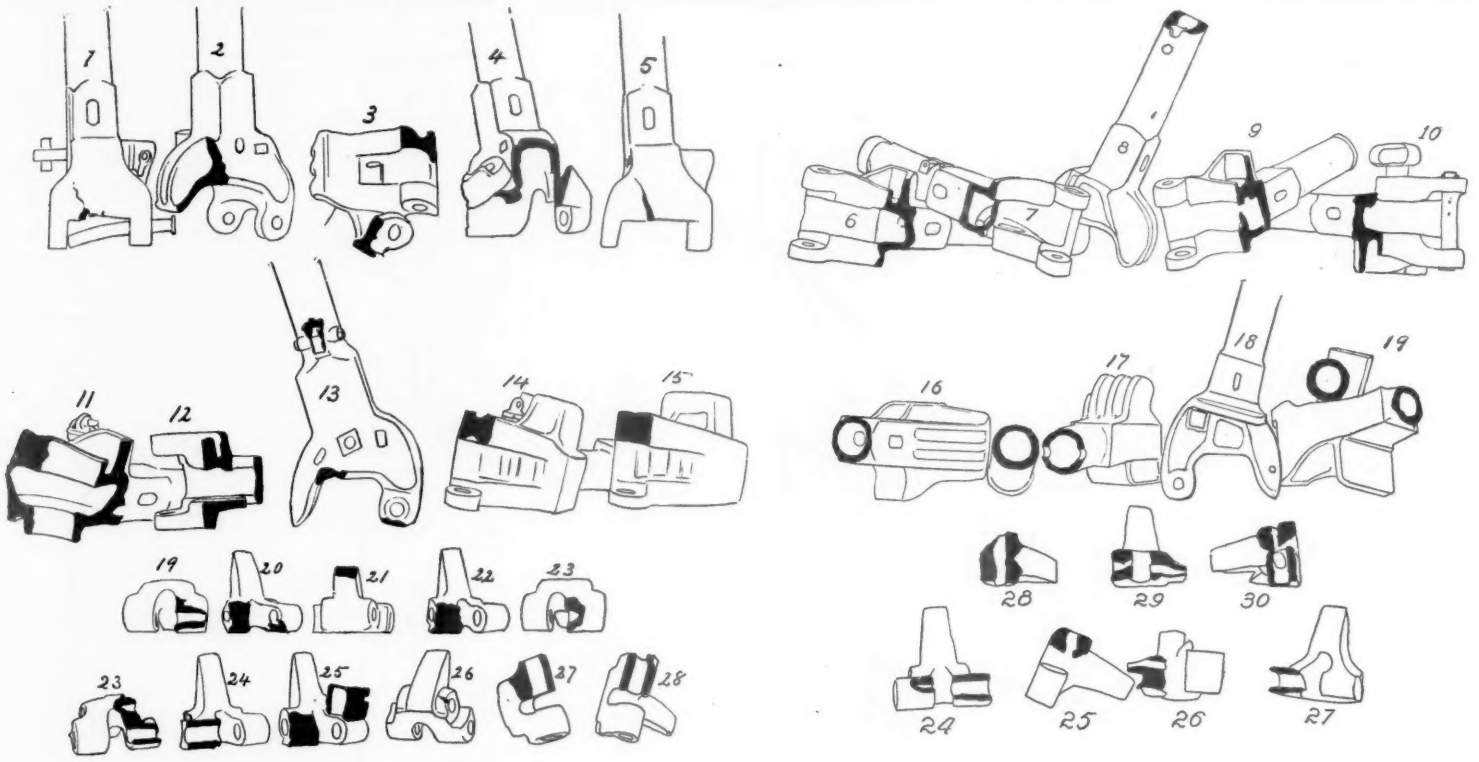
1. All operations are by positive making and breaking of metallic connections. "Shunts," by which a small portion of a current still flows through the instrument intended to be devitalized, are not used. With this apparatus the amount of battery power may be variable within wide limits, and extreme delicacy of adjustment of magnet armatures is not important. The number of electro-magnets is reduced to a minimum and the labor of care and inspection is correspondingly less. With these advantages, supplemented by good design and workmanship, the number of unnecessary stops is claimed to be largely reduced. In fact, the company shows records of signals which have run a year without giving a single false indication. It is claimed that such a thing as showing safety while danger exists has never been known, and is, in fact, impossible.

The weak point in the Hall signal is that the foremost wheel of a train going out of a section will clear the signal at the entrance to the section, thus admitting a following train, when in fact the hind portion of the outgoing train may have become detached and be standing in the section. The company admits this point, but claims that the superior reliability, with reduced cost of the system, is of enough value to outweigh it. A simple plan is proposed for equipping cabooses with broad tread wheels, so that only the tail end of a train can clear a signal. The prices charged are about the same as those asked for the Union track-circuit signals. The company also furnishes a combination of track instruments, interlocking instruments and relays by means of which, when two or more trains enter a section of, say, one mile in length, the trains being a half mile apart, each train will, on passing a track instrument 2,000 ft. after entering the section, break the circuit controlling the signal in such a way that only the last train can restore it to "all clear;" in other words, a train passing out of a section cannot clear the signal at the entrance of the section if a following train has already got 2,000 ft. within it.

The cost of operation of the Hall signals cannot be stated with accuracy because the form now being used most extensively has not been in operation long enough to afford a good basis for estimating. The maintenance of a number of the signals on the New York, New Haven & Hartford has cost about $65 per year, but the battery power of the later patterns is greatly reduced and the cost of material and of labor is correspondingly less.

BLACK'S MECHANICAL BLOCK SIGNAL.

This apparatus, which was described and illustrated in the *Railroad Gazette* of Jan. 24 last, is used on the Manhattan Elevated (New York City) and other passenger lines in the vicinity of that city. The Manhattan has a series of 32 continuous block sections in operation. The instrument consists of a small semaphore, the post being cast iron, which is set to danger by a lever actuated by the wheels of a passing train. The same signal is connected by a gas-pipe rod, extending along the road, with another track instrument at the outgoing end of the section, and the train, on striking this, resets the signal at safety. The maximum length of block operated is about 1,700 ft., and at this distance the signals have



Dec., 1889.

PHOTOGRAPHIC RECORD OF BROKEN COUPLERS.—CHICAGO, BURLINGTON & QUINCY.

worked with great success for two or three years. It will be understood that the moderate speed and uniform length of the trains on these city railroads permit the use of a signal whose capabilities for longer blocks or for more varied service are limited.

To briefly summarize the salient features of the different systems of block signaling, it may be said that the simplest form, that which we have termed "single-track blocking," and which is used on various Western roads, is cheap, readily adapted to nearly all roads of light traffic and generally to a road of any traffic, and is an absolute necessity to any road which would avoid the well-known difficulties connected with protecting trains from rear collisions by flags, lamps and torpedoes. The drawbacks to the use of this system are the liability of officers and trainmen to expect more of it than it can, in the nature of things, perform. Where there is only one signal at a station, while there may be two or a half dozen switches; and where the distance between stations is so long that trains must sometimes be allowed to follow each other within the same block, the *block system* is not responsible for and cannot be charged with the various dangerous contingencies that may arise. In fact, the system can in such cases be used only a part of the time. The danger is that when or where it is not in use the men are liable to assume, perhaps unconsciously, that it is in use, instead of adopting other precautions such as would be taken had the block system never been heard of.

The block system in use on the Pennsylvania is simply a more careful and systematic application of this same principle. The only reason why scores of roads do not imitate the Pennsylvania seems to be simply a lack of the courage requisite to incur a considerable expenditure for first cost, and a failure to appreciate the fact that short sections are not essential to the utility of the system. Officers too readily assume that a large expenditure for operators (to give their exclusive attention to block signaling) is indispensable, whereas the system in many cases could be advantageously adopted without going to that expense.

The Sykes system is admitted by the best judges among those who have used it to be valuable, but its cost both for introduction and maintenance is rather high. Its use is still limited to the busiest lines, even in England. Its value is largely or wholly neutralized if permissive blocking is practiced, and very few roads have progressed to the point where they wholly forbid that practice.

The special merit of automatic signals lies in the possibility of reducing the running expenses 90 per cent., more or less, below the cost of a man-operated system. Assuming that such imperfections as they are now burdened with can be eliminated, and especially that they can be made perfectly self-detecting, the question concerning their general availability is, Will the unnecessary stops caused by failures of apparatus and extraneous accidents delay traffic to such an extent as to compel a resort to the regular block system (with operators at each station)? Some English experts claim that this will be the ultimate outcome. It is to be remembered, however, that they judge largely by experience on the most crowded lines, and that by reason of the low rates of wages in that country the question of operating expense does not assume the same importance that attaches to it here. Granting this point, it still remains true that many hundred miles of road in this country now carry a volume of traffic sufficiently large to demand a block system of some sort, while, at the same time, they will not for many years be used by a sufficient number of trains to make five-minute delays intolerable.

It may therefore be said that there are three classes of roads in this country which afford fields for three different kinds of block signaling respectively:

1. Those parts of large roads which lie in the vicinity of the principal cities, where yards are located very close together, and where the traffic is very heavy—these need man-operated signals, with short blocks.

2. Many double-track roads of less importance need the block system, but cannot afford to establish stations as close together as is necessary to run trains at short intervals. This is the field for automatic signals.

3. The roads of thin traffic and with long stretches between stations cannot afford special block operators, and cannot afford even the few hundred dollars per block necessary to establish an automatic system. These should block by means of their regular station operators. This is especially true of roads where, by reason of heavy grades, prevalence of fogs, or other conditions, the speed of trains cannot be maintained at a reasonably uniform rate, and of those located in northern climates where flagging in winter is dangerous both to the men and the trains.

A Crane for Handling Ashes.

Mr. Edward Evans, Master Mechanic of the Cincinnati, Washington & Baltimore at Chillicothe, O., has an excellent labor-saving device of his own design in the shape of a crane for handling ashes. The crane is located between the ash-pit track and another track where a gondola car is kept for receiving ashes, which are raked out of the ash-pans of engines directly into a sheet-iron box, about 8 ft. long, and in width the same as the distance between the walls of the pit. This box when full, is lifted by the crane, and after being swung round so as to be over the gondola, its hinged bottom is tripped and the ashes drop into the car. The lifting chain of the crane passes down the centre of the mast and round a shieve at its foot, and can be either operated by a winch or attached directly to an engine. The saving in shoveling is obvious, and when a track can be reserved for gondola to receive the ashes, Mr. Evans' device is well worth a trial.

Freight Car Couplers on the C., B. & Q.*

As the subject of freight car couplers was brought to the notice of this Association through the discussion held at the March meeting of the New England Railroad Club, I shall ask your attention to a review of some of the principal objections urged against the Master Car Builders' type of coupler, by those taking part in the discussion, as I firmly believe the conclusions arrived at by the author of the paper read before the New England Club, are not only unjustified by the facts of the case, but so entirely at variance with them that exactly the opposite is true.

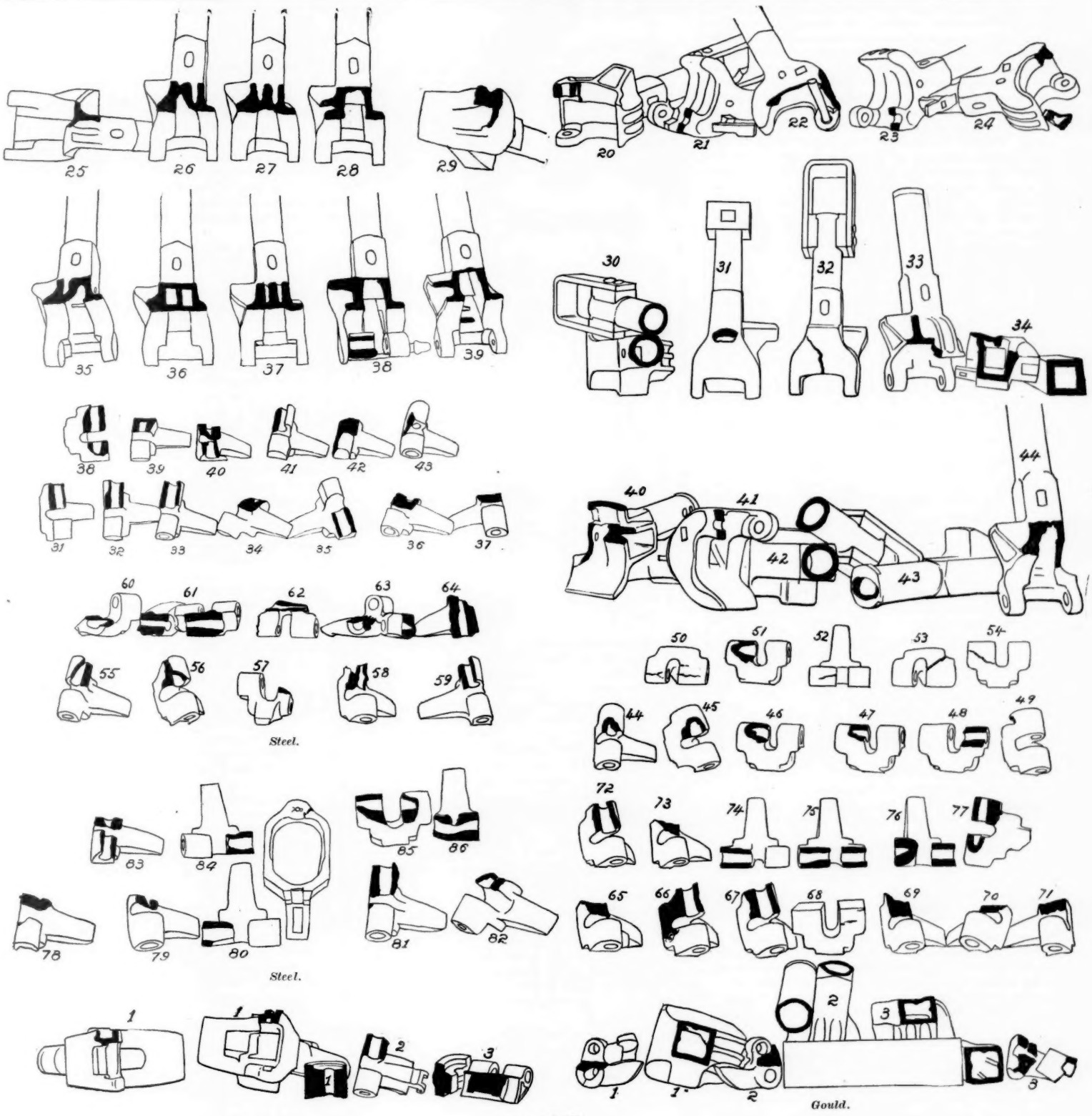
In a paper read at this meeting, the action of the Master Car Builders' Association in the coupler question is very severely criticised and condemned. 1st. On account of their not adopting a "standard coupler" instead of a "standard type." 2d. Because of the alleged inherent weakness of the couplers of the type adopted.

Taking these objections in their order, let us first consider why the vertical plane type of the coupler was adopted by the Master Car Builders' Association. . . . There is one reason which the author and others participating in the discussion, left entirely out of account, and which more than outweighs all the other considerations discussed, namely:—the fact that the vertical plane type of coupler is the only kind known that will give a close coupling with varying heights of drawbar. As varying heights are indispensable as long as loaded and empty cars are hauled in the same train, it is the only style of coupler consistent with a close coupled train. Why close coupling is important is apparent to all who followed the very extensive series of tests made by the Master Car Builders' Committee on Automatic Freight Brakes in 1886 and 1887. . . . No one, I believe, now doubts the impracticability of a solid-head hook-coupling in freight service, leaving the hinge-hook coupler the only practical solution of the question, when the importance of the vertical plane principle is recognized.

. . . The New England Club's representative "strenuously" contends "that a standard freight car coupler is absolutely necessary for the most complete safety and economy." How to bring about this much-to-be-desired condition of things, he omits to state. Would the adoption by the Master Car Builders' Association of any particular coupler have insured its replacing all existing styles of drawbars? Certainly not. If it had any effect it would have given the coupler adopted an unfair advantage over others, perhaps equally as meritorious, and at the same time tended to hinder improvement by fostering monopoly. The adoption of a type, however, still leaves the field open for several competitors, encourages improvement and tends, by the survival of the fittest, to ultimately give us the ideal coupler; while, until this is reached, we have among the couplers in use, entire interchange-ability by reason of the standard type.

Let us now look at the second point in this paper, namely, the alleged inherent weakness of the Master Car Builders' type. The table of breakages shown by the author is so devoid of accompanying data as to the number of cars in service equipped with the different kinds of couplers, that no criticism will be attempted. The C., B. & Q., about a year ago, equipped 500 cars, mostly stock cars, with one of the Master Car Builders' type of couplers. Previous to this 100 cars had been equipped with the same coupler, but of an older model. The record of knuckle breakages in the 100-car lot was not entirely satisfactory. These knuckles were made

* A report read by Mr. E. M. Herr, Superintendent Galesburg Division C., B. & Q. R. R., at the regular meeting held at headquarters, Room 27, Union Depot, Peoria, Ill., Friday, May 9, 1890.



March, 1890.

PHOTOGRAPHIC RECORD OF BROKEN COUPLERS.—CHICAGO, BURLINGTON & QUINCY.

of malleable iron and did not stand the service. Cast steel was afterward tried, but that also proved unsatisfactory. It is undoubtedly the breakages from this lot of couplers that another member of the New England Club refers to in his remarks as "the wonderful story told by the C. B. & Q. scrap-pile."

The makers finally adopted wrought iron for the knuckle, and these couplers, as far as the breakages are concerned, have given quite a remarkable record. When the wrought iron knuckle couplers were put in service, orders were issued to send all defective Master Car Builders' bars, or knuckles removed from cars in service, to the headquarters of our Motive Power Department, where pains are taken to photograph them, besides keeping a careful record of the way in which breakages occurred, if known.

In six months, with 592 cars equipped with these couplers, there were returned from the entire C., B. & Q. system 19 broken bars and 30 broken knuckles. This also includes breakages on our line from all foreign cars equipped with the Master Car Builders' coupler. The number of such cars much more than equals the number of C., B. & Q. cars equipped with the Master Car Builders' couplers and off the line; for, as above stated, nearly all these are stock cars which are used almost entirely in our local traffic. I have here prints from the negatives, showing the breakages from 1,184 couplers during the first six months in service. The plate showing seven broken knuckles marked "steel," is a photo of steel knuckles found on the line which must have belonged to foreign cars, as we do not use this material. How many of the bars, if any, are from foreign cars it is impossible to say.

Assuming that the broken parts from foreign cars are just offset by parts of couplers broken away from home, the following tables have been prepared, and were a portion of the "record" and "calculations" made with a lot of assumed figures, referred to in the paper under consideration:

KIND OF FRACTURE OF MASTER CAR BUILDERS' COUPLERS ON C., B. & Q. DURING SIX MONTHS OF 1889.

Coupler fractures.		*Knuckle fractures.*	
Arm breakages	7	Upper lug breakages	16
Lug breakages	4	Lower lug breakages	1
Back breakages	2	Both lug breakages	12
Shank breakages	4	Tail breakages	1
Bracket breakages	1	Total knuckle fractures	30
Miscellaneous breakages	1		
Total coupler fractures	19		
Couplers in service one year			592

FRACTURES PER 100 COUPLERS IN SERVICE ONE YEAR, DURING SIX MONTHS OF 1889.

Coupler fractures.		*Knuckle fractures.*	
Arm	1.18	Upper lug	2.70
Lugs	.68	Lower lug	.17
Back	.34	Both lugs	2.03
Shank	.68	Tail	.17
Bracket	.17	Total knuckles	5.07
Miscellaneous	.17		
Total couplers	3.22		
Equated number of couplers			592

PERCENTAGES OF VARIOUS KINDS OF COUPLER FRACTURES DURING SIX MONTHS of 1889.

Couplers.		*Knuckles.*	
Arm	36.8	Upper Lug	53.4
Lugs	21.0	Lower Lug	3.3
Back	10.7	Both Lugs	40.0
Shank	21.1	Tail	3.3
Bracket	5.2		
Miscellaneous	5.2	Total	100.0
Total	100.0		

Having a record of breakages for a definite number of couplers in service a known length of time, we can form an intelligent idea of the relative cost of maintenance, as far as breakages are concerned, of the Master Car Builders' and the ordinary link and pin coupler, as shown by experience on the C., B. & Q.

During the year 1888 on this road, the following material was consumed in maintenance of couplers:

60,880 links, costing	$13,305.60
100,797 pins, costing	12,846.40
6,826 (Potter) drawbars, costing	29,900.80
Total cost	$56,142.80

This form of the Master Car Builders' coupler costs $12.50 each, complete, or $25 per car; the wrought knuckle costing $4.39. If, therefore, the rate of breakage shown by the six months record should continue (which it should not, as the number of failures during the first few months' service of any lot of couplers can fairly be taken to be greater than during the average life on account of inherently defective specimens breaking early) the cost of maintenance per coupler per year,

on account of breakage, would be 84 cents. The manufacturers, however, replace half of the couplers. The expense per car per year is, therefore, 48 cents. In 1888 the C., B. & Q. had 20,140 freight cars, making the expense of maintaining the link and pin drawbar $2.79 per car per year, showing the Potter to be 5.8 times as expensive as this form of Master Car Builders' coupler, leaving out the question, for the present, of other failures than breakages. It may be said that the records of the broken parts may be incomplete, by some parts reaching the scrap-pile before a record is made. Granting that the records may be incomplete from this cause, it is hardly supposable that only one-half are found and reported; even if this was true, without allowing anything for the increased breakage of "young" couplers and those replaced on account of inherent defects, we have an ample margin, from the standpoint of economy, in favor of the Master Car Builders' type.

When consideration is also given to the growing necessity of a close coupler, on account of the impracticability of operating the air-brakes on long trains with slack in the couplings, the freedom of motion between cars of different heights, the ease with which it can be uncoupled on curves, and the increased safety to trainmen which this coupler affords, the conclusion is forced upon us that were breakages the only means of failure, the Master Car Builders' type of coupler, when made of the proper material, left little to be desired.

Since this six months record has been completed, however, the record of these couplers for an additional three months has been kept, and I am pleased to be able to present it at this time. During the three months beginning Jan. 1, 1890, the following record is shown of broken Master Car Builders' couplers on all parts of the C. B. & Q. system:

KIND OF FRACTURE OF MASTER CAR BUILDERS' COUPLERS, ON C., B. & Q., DURING THREE MONTHS IN 1890.

Coupler fractures.		*Knuckle fractures.*	
Arm breakages	10	Upper lug breakages	39
Lug breakages	8	Lower lug breakages	5
Back breakages	2	Both lug breakages	10
Face breakages	1	Pivot pinhole breakages	2
Shank breakages	3		
Miscellaneous breakages	1	Total knuckle fractures	56
Total coupler fractures	25		

Couplers in service one year..... 296

FRACTURES PER 100 COUPLERS IN SERVICE ONE YEAR, DURING THREE MONTHS OF 1890.

Coupler fractures.		*Knuckle fractures.*	
Arm	3.38	Upper lug	13.20
Lugs	2.70	Lower lug	1.68
Back	.67	Both lugs	3.37
Face	.34	Pivot pinhole	.67
Shank	1.01		
Miscellaneous	.34	Total knuckles	18.92
Total Couplers	8.44		

Equated number of couplers.....:296

PERCENTAGES OF VARIOUS KINDS OF COUPLER FRACTURES, DURING THREE MONTHS OF 1890.

Couplers.		*Knuckles.*	
Arm	40.0	Upper lug	69.64
Lugs	32.0	Lower lug	8.93
Back	4.0	Both lugs	17.86
Face	8.0	Pivot pinhole	3.57
Shank	12.0		
Miscellaneous	4.0	Total	100.00
Total	100.0		

This, it will be seen, is almost three times as bad a record as the preceding six months showed. This cannot all be chargeable to the incompleteness of the previous record, as the number of foreign cars equipped with Master Car Builders' couplers is constantly increasing on our line, which, of course, correspondingly increases the number of breakages of this type of coupler. There is no data available showing how many such cars are in our service, but the photographic record herewith clearly shows at least four out of the 25 broken bars, and 19 of the broken knuckles (steel) to be from foreign cars. There were probably others not shown, but as I wish to deal with the facts only, and prefer to err in under rather than in over-estimating the record of this coupler, the calculations given below are based on there being four foreign bars and 19 foreign knuckles in this record.

The cost per coupler per year, including all breakages reported is by this record 68 cents for couplers and 83 cents for knuckles, or a total for breakages per coupler complete of $1.51. Deduct the proportion, one-sixth of bars and one-third of knuckles known to be from foreign cars, leaves 57 cents for couplers and 55 cents for knuckles, giving a total on account of breakages of $1.12 per coupler complete per year. As the manufacturers replace one-half of all broken parts, the cost per car per year is of course the same, or $1.12. To this must be added the cost of replacing worn out knuckles. This item of expense, which, as far as I can learn, has heretofore been left entirely out of account in discussion of this question, seems liable to be of greater magnitude and a more serious difficulty than the mere matter of breakages.

The expense of maintaining the coupler on account of the wear of the knuckle, does not appear in the six months record, as it is only during the past three months that they have begun to wear out. The nine months record of the 592 cars, however, shows 12 worn out knuckles; most, if not all, of these worn out knuckles, however, have come from couplers in service on tenders instead of cars, making this record a less valuable one for the purpose of comparison, as it is a notable fact that the wear of knuckles on tenders is much greater than on cars. This is probably due partly to the greater amount of movement between tender and cars while in motion than between cars of the same or similar construction, and partly to the very much greater mileage made by tenders. It is to be regretted that our records do not enable us to state positively in what service these knuckles have been worn out, but a careful personal inspection of the knuckles in a considerable number of this lot of couplers after they have been in service on cars upwards of ten months, has failed to discover a single knuckle badly worn. That this should be so is not strange when the enormously greater mileage made by some of our passenger engines is considered. On two engines in passenger service and making between 9,500 and 10,000 miles per month, a knuckle was worn out in three months. This mileage, monthly, is about equivalent to ordinary yearly mileage of a freight car. If the amount of movement between the tender and cars were the same as between cars themselves, this record would indicate about a three-years' life for knuckles in freight service. This is probably much too low for an estimate, and indeed one based on so few and incomplete data that no attempt will be made to elaborate it.

The importance of accurately kept records of new devices in actual service is clearly seen by the results of this investigation, and it is hoped that at no distant day we may be able to predict with certainty the cost of maintenance of the Master Car-Builders' type coupler, when properly made and of good material. Enough is known, however, to make it certain that a return to the "old, well-tried automatic link and pin couplers" would be a long step backward.

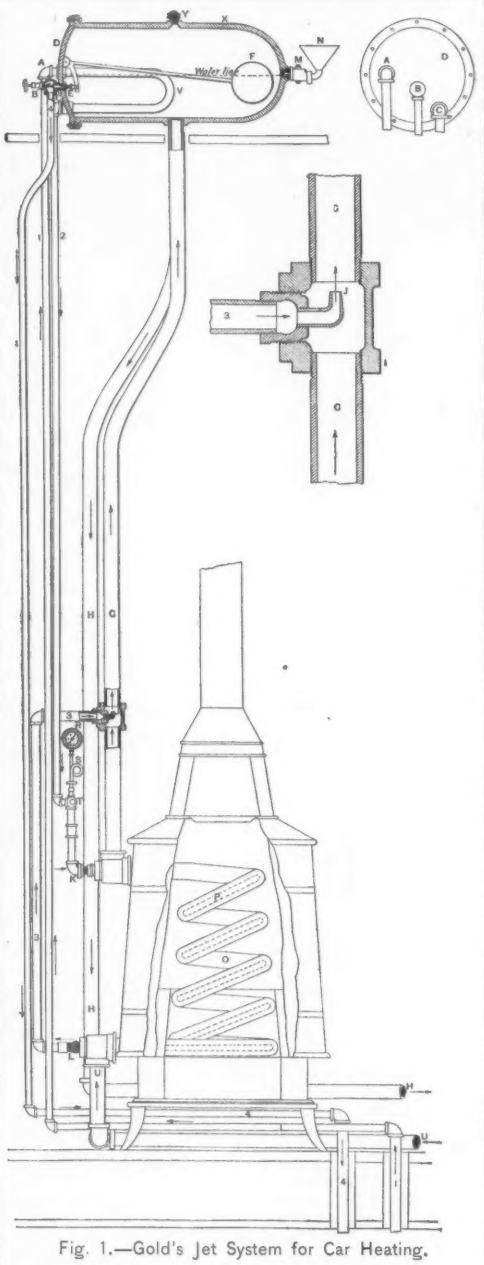


Fig. 1.—Gold's Jet System for Car Heating.

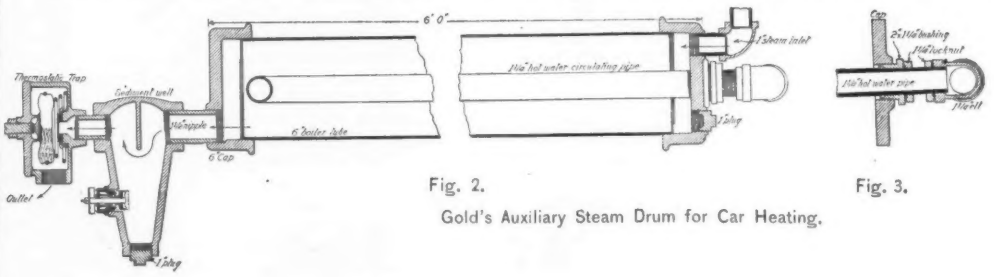


Fig. 2. Fig. 3.

Gold's Auxiliary Steam Drum for Car Heating.

Gold's Improvements in Car Heating.

The Gold Car Heating Co. has made two important additions to its system for heating passenger cars during the past winter, and it is claimed that the new apparatus furnishes the most rapid circulation possible by any system of heating by hot water.

The first of these is known as the Jet system. This is applied to the Baker heater with the Gold double coil, which heats and circulates the water by steam direct from the locomotive. The special feature is an expansion tank which is about twice the size of the ordinary expansion tank, and is called a combined drum and steam trap. This is shown in fig. 1 at *X*. It has a flanged head *D*, tapped for a 1-in. pipe connection at *A* and *C* and for an overflow at *B*.

The main steam supply (pipe 1) is first made to pass through the tank or drum by the pipe *V*, and from thence into the double coil through *K*. This protects the tank, and no delay is encountered when starting circulation even if the water should be frozen in the tank, as this steam pipe will rapidly thaw it out. The valve at *T* where the steam enters the coil is a combined angle and check valve, to prevent backing up of water when a fire is built in the stove.

The steam passing through the coil starts the circulation of water up the pipe *G*. The steam itself coming out at the lower end *L*, into pipe 3, is discharged in its partially condensed state through the jet *J* into the hot-water circulating pipe *G*. This jet of boiling water and steam, being thrown into the warm current started by the coil, at once greatly accelerates the circulation, which is fully established in from 10 to 15 minutes without any noise or cracking whatever.

All the water of condensation is in this manner injected into the circulating system, and the overflow is discharged through the overflow pipe 4 by means of the valve at *B*, the seat *E* of the valve being opened by the float *F* as this float is raised when the extra water of condensation enters the system. The overflow pipe is run under the car and close to both the crossover pipes, the heat from the hot water serving to protect the circulating pipe from freezing. It will be seen that no other steam trap is required for discharging the water of condensation from the car. It has been demonstrated that this system of injection of partially condensed steam into the water pipes after the water has been already heated by the double coil produces no noise under any circumstances.

The other device referred to is illustrated in figs. 2 and 3, and is called the Auxiliary Steam Drum. This is also used in connection with the double coil in the Baker heater and as an auxiliary to it. The piping in the car is the same as is used for the simple Baker heater. Either salt or fresh water may be used, and a fire may be built in the Baker heater in the usual way should it be impossible at any time to obtain steam from the usual source, or for any other reason. The main point claimed with this as with the other improvement, is rapid circulation. Both steam from the engine and a live fire may be used simultaneously if desired, the circulation being always in the same direction.

The drum consists of a wrought iron tube 6 ft. long and 6 in. in diameter, fitted with caps at each end. One of these caps is tapped with three inlets, one of which is for the steam pipe and the other two for the hot water circulating pipes. The cap of the other end is tapped for connection with a stream trap to carry off the water of condensation. The drum is placed longitudinally under the car, and at right angles to the hot water crossover pipe furthest from the stove, and is protected with a thick covering.

The steam, after having been admitted to the double coil in the stove from the main steam supply pipe, and the circulation started at that point, passes out at the lower end and thence through the auxiliary steam pipe directly to the drum, where it is made to run twice through the entire length of the drum. The internal pipe shown in fig. 2 is U-shaped, and both its ends come out at the right-hand end of the outside cylinder. The steam admitted to the drum at once accelerates the hot water circulation, and with this aid circulation is established in about one-half the time it otherwise would be. In the largest Pullman cars a complete circulation is obtained by this system in from 15 to 25 minutes; whereas with the old Baker heater from one and a half to two and a half hours is always required. In smaller passenger and other coaches the double coil alone has been found to do the work almost as quickly, but for the largest cars the drum is used to fully insure the desired rapidity of circulation.

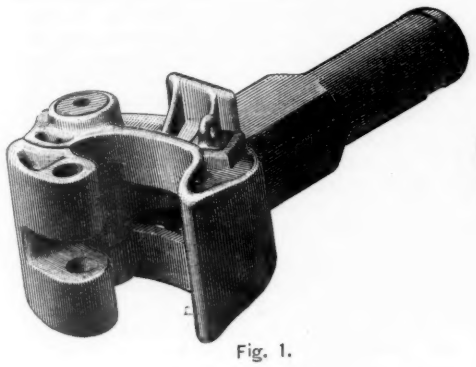


Fig. 1.

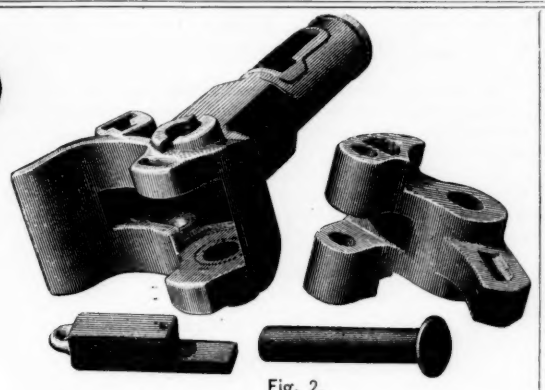


Fig. 2.

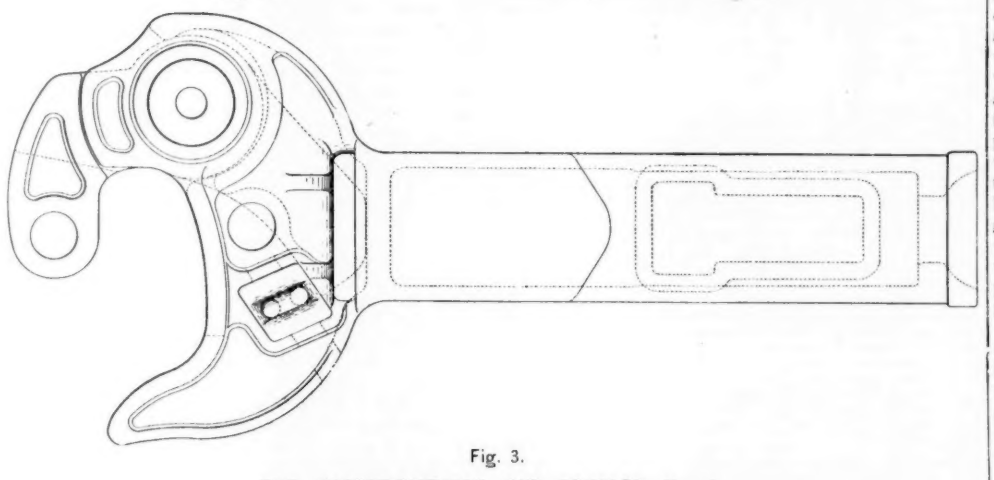


Fig. 3.

THE ROBERT-EASTWICK CAR COUPLER No. 2.

The auxiliary steam pipe is further utilized by running it close to the hot-water pipe, where it re-crosses under the car nearest the stove; this still further helps the circulation and avoids the possibility of freezing. No packing or expansion joints are used in this drum, as all expansion is allowed for in the construction, and all leakages are avoided. All the condensation from the double coil and the auxiliary drum is discharged from the "Excelsior" steam trap at the lower end of the drum. One valve only is required, which admits the steam from the main steam supply pipe to the coil.

The Robert-Eastwick Car Coupler No. 2

This coupler, which has been recently perfected and is now offered to the railroads, is very well illustrated in the engravings which accompany this article. Fig. 1. shows in the perspective the top view of the coupler, and fig. 2. the bottom view of the draw-head with the three principal parts. These were made from photographs. Fig. 3 is a plan showing in the dotted lines that part of the knuckle which is inside the draw-head. The draw-head is made of malleable iron and the knuckle and two pins are made of cast steel. The weights of these parts are as follows: knuckle, 66 lbs; draw bar, 126 lbs; pins, 9 lbs. and 5 lbs.

The peculiarity in design of this coupler to which the inventors attach considerable force, is the shape of the knuckle. It will be seen that the centre line of the draw-head passes between the pivot pin and the locking pin. The result of the form of the knuckle is that pulling strains tend to close the knuckle instead of to open it, on account of the long lever arm from the locking pin to the centre of the pivot. Consequently, as wear takes place about the pivot the knuckle is drawn in closer to its coupling position and the danger of uncoupling is obviated.

Buffing strains are transmitted along the centre line and taken, through the shank of the knuckle, on the solid end of the draw-bar shank; consequently there is no strain on either pin in buffing. The diameter of the pivot pin is $2\frac{1}{16}$ in., and the wearing surface of the knuckle against this pin 33 sq. in. The bearing on the locking pin is $2\frac{3}{4}$ sq. in.

Another important, although minor consideration, is that there are no projecting pins or other parts above or below the body of the coupler to be knocked off or bent by over-riding.

Provision is made for inserting the tail bolt without removing the knuckle, and consequently the front end of the draw-bar shank is made solid to take the buffing strains as described above. All parts of the coupler are made to templates and are perfectly interchangeable, and it is designed with such conformity to the M. C. B. lines that it will couple with all other couplers made on those lines. The departures from those lines have been in the increase in length and thickness of the horn and in the convexity of the front surface of the knuckle.

Fox Solid Pressed Steel Passenger Car Truck.

WITH AN INSET.

The drawings on the inset herewith show one of the most interesting designs for passenger trucks which have been brought to notice in this country for some time. It is constructed almost entirely of pressed steel made by the Fox process. The parts were made in England at Leeds; that is for the first few trucks. Hereafter they will be produced at Joliet, Ills., by the Fox Solid Pressed Steel Co. Several sample trucks of this design have been sent to the P. R. R. for trial.

In fig. 1 is shown the side elevation of the truck on which can be seen the pressed steel side frames shown in section in fig. 4 and in plan and end elevation in figs. 2 and 3. There is a flange all around the side frame, turned outward at the top, and inward at the bottom, as shown in fig. 3. A wearing surface at the jaws is formed by riveting on a thickening piece, clearly shown in figs. 1 and 2.

The end frame of the truck is also of pressed steel, being of channel form, securely riveted to the side frame. The safety beam is made of channel pressed steel and to it is bolted the safety strap, as shown on the right hand side of fig. 1. The ends of the safety beam are rivetted to the end frame of the truck.

The centre plates are of pressed steel of spherical form, as shown in Fig. 1. The swing bolster and transoms, also of pressed steel, are clearly shown in detail in fig. 5. The brake beams are pressed into the form of the wooden beam and stiffened by rivets passing through the flanges, as shown in fig. 2. The attachments to this truck are interesting because of the novel construction. All of the details are so clearly shown as to render further description needless. However, it may be well to add that the design makes a handsome, light truck of great vertical strength.

The Springfield Emery Wheel Co.'s Valve Surfacer.

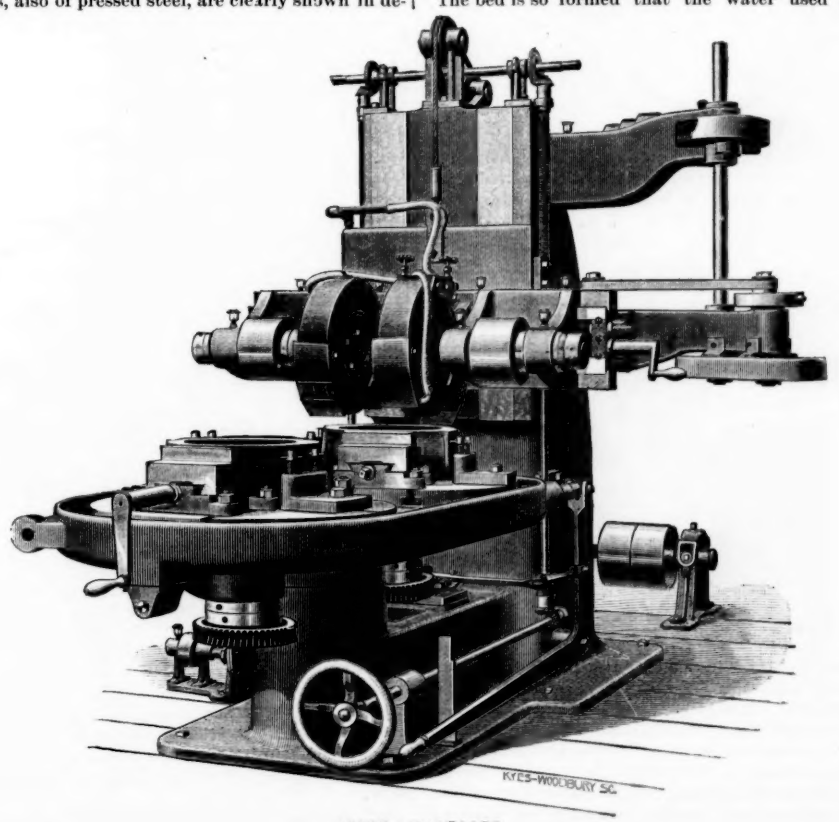
This grinding machine, the patents for which are controlled by the Springfield Emery Wheel Mfg. Co., of Bridgeport, Conn., belongs to that class in which one or more revolving abrading wheels are arranged to so operate on the surface of the work as to reduce it to a true plane. The abrading medium is composed of two emery wheels of corresponding diameters, which have a common revolving and laterally reciprocating movement and a common vertical adjustment, and in addition each wheel can be independently adjusted both laterally and vertically. The upright arm of the frame is formed with a vertical face of considerable area on which a head block is adapted to move horizontally. On the head block is placed a cross head arranged so as to have free lengthwise movement. This provides for the adjustment of the grinding wheels vertically and horizontally. The lateral adjustment of the wheels is for the purpose of gauging the distance between them according to the width or diameter of the work to be operated upon, while the vertical adjustment is for the purpose of compensating for unequal wear of wheels by slightly depressing the one that wears away most quickly.

The two vertical screw shafts shown at the sides of the frame have right and left threads, and pass through hubs carried by the heads block. On the upper ends of these shafts are bevel gears with which engage similar gears on the ends of a shaft mounted on top of the frame, by means of which the head block and the wheels carried by it can be raised or lowered.

Projecting from near the top of the upper part of the frame is a bracket in which is mounted a vertical shaft driven by a worm and gear, the shaft being splined to the gear and its lower end being mounted in a bracket secured to the head block. On the lower end of the shaft is a gear, meshing with another on the end of a short vertical shaft mounted in the same bracket. The upper end of the shaft carries a crank disc having a crank pin that can be adjusted toward or away from the centre. A link connects the crank with the crosshead. The revolution of the worm shaft by suitable belt and pulley will impart a horizontal reciprocating movement to the crosshead and wheel, and the amount of this movement can be changed as necessary by adjusting the crank pin.

This compound movement of the wheels greatly increases the speed of the work, but this result is still further augumented by the revolving movement imparted to the work itself in a plane at right angles to the plane of revolution of the wheels. In the machine here shown there are two work-holding mechanisms, one of which revolves the work under the wheels, while in the other new work is being placed. The short shafts of the tables carrying the work are mounted in vertical bearings formed upon opposite sides of the centre of a bed mounted upon a hub of the frame.

The bed is so formed that the water used for wet



VALVE SURFACER.

grinding is led to a reservoir in the frame. Upon the upper surfaces of the tables are clutches for holding work. Upon the lower ends of the shafts of the tables are worm gears. When the bed is turned to bring one of the tables under the abrading wheels its worm gears engage with a worm shaft provided with a driving pulley at its opposite end. This shaft is so mounted that its worm end may be moved so as to disengage the worm from the gear and permit the turning of the bed. Provision is made for locking the bed in place with one or the other of the tables under the wheels.

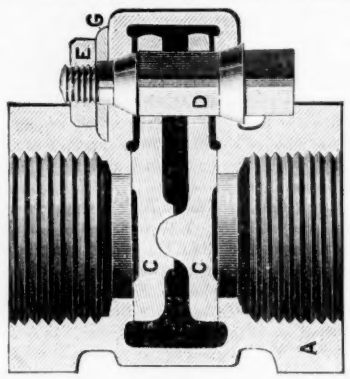
This machine is designed for grinding the annular bearing surfaces of valve bodies and other similar circular work in which the wheels operate at diametrically opposite points, but it is adapted to operate equally well upon flat surfaces generally. The machine weighs 9,500 lbs., and it carries two wheels 14 in. × 2½ in.

The Western agency of this company is at Nos. 18 and 0 West Randolph street, Chicago, Ill.

A Novel Valve.

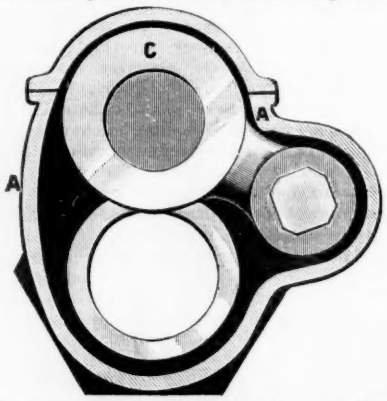
The accompanying illustrations show a straightway valve intended to be used for steam, water, gas, oils, etc. This is now being placed upon the market by the Lunkenheimer Brass Manufacturing Co., of Cincinnati, O., who have recently made extensive preparations for its manufacture.

The simplicity, compactness and convenience of operation by means of a lever are the striking features of this valve. In size it is smaller than the ordinary globe

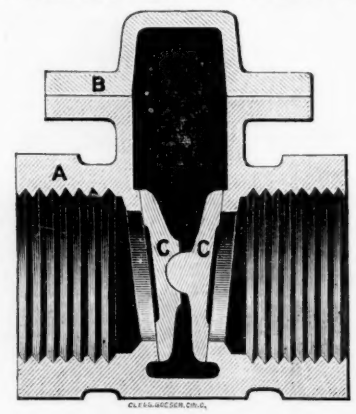


valve. The sectional cuts are self-explanatory, and upon reference to them its operation will be readily understood.

The two disks *C C* are independently and loosely secured to the operating stem *D*, and are adapted to close



against tapering seats in the valve shell, and, being provided with ball-and-socket bearings at their backs, are evenly wedged against their corresponding seats when the valve is closed by the lever. The stem *D* is operated



by a lever, and turns in tapering ground joint bearings, and is held in place by nut *E*, which is guarded against displacement by a washer *G*, on the same principle as used in the ordinary steam stop-cock. Any desired friction can be brought to bear on this stem by means of the nut, thus securing a steam-tight joint and dispensing with the usual stuffing-box. This frictional bearing also prevents displacement of the valve disks and lever, so that the valve will remain at any desired opening. The lever fits a square on the end of the stem, and is detachable.

The valve is easily taken apart when necessary by unscrewing nut *E*, and upon removal of washer *G*, stem *D* and cap *B* the disks can be withdrawn from the valve shell.

These valves are at present being made in sizes in brass from ⅛ in. to 3 in., and in iron from 2 in. to 6 in. Sizes larger than 4 in. are not so well suited for steam above 80 lbs. pressure. This valve has been named the "Handy" valve.

The Morton "Heat Storage" System of Car Heating

In the Morton Safety Heating Co.'s system live steam is passed through pipes of a non-metallic porous substance, which stores the heat and gives it out gradually, giving it out through the raidating pipes. The earthenware tubes are of 12-in. lengths encased in iron pipe 4 in. diameter. Through the earthenware pipes is a 1¼ in. channel for the passage of steam. The water of condensation falls by gravity and is taken off through one trap. It is claimed that the earthenware pipes are practically indestructible and the expense of equipping a train is small.

Trains on the Roanoke & Southern and the Shenandoah Valley roads have been equipped with this system and a public test was given at Roanoke, May 24, on one of the Shenandoah trains. The exhibition was witnessed by the leading officials of the Norfolk & Western and Shenandoah roads and was very satisfactory. Many experiments have been made during the past winter at Baltimore. A street car of the Madison Avenue route of the Baltimore City Passenger Railway Co was equipped with the Morton system. The car contained about 30 ft. of 4-in. pipe, 15 ft. running lengthwise on either side of the car, under the seats.

March 7, a test was made. Temperature inside of the car was 26°, outside 22°. The car was heated to 75° in seven minutes with 45 lbs. pressure through a connecting service pipe 50 ft. long. After steam was shut off the car was taken to the company's stable, the temperature having risen to 78° after the steam pipe had been disconnected. The car started on its regular trip with the temperature inside at 75°. When part of the way down one of the large windows was lowered, all the top ventilators were opened and the door opening and closing for the usual ingress and egress of passengers. The cars made the trip and returned to starting point in 2 hours 23 minutes, the thermometer at that time indicating 53°. The special advantages claimed for this system are the long retention of heat, safety and economy. Further information regarding the system may be obtained from the Morton Safety Heating Co., 106 East Saratoga street, Baltimore, Md., and 45 Broadway, New York City.

The Synchronization of Clocks at a Distance.

BY GEO. W. BLODGETT.

The correctness of the standard time for railroad trains is a matter of such importance as sometimes to

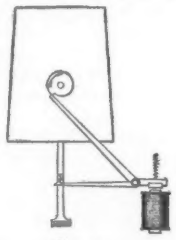


Fig. 1.

justify a considerable outlay for time service. Since, however, a fine timepiece is a quite costly affair, and cannot be provided for every small station, where yet it is important to have correct time, much attention has been given to methods of regulation or synchronization, whereby ordinary clocks may be kept in correct time.

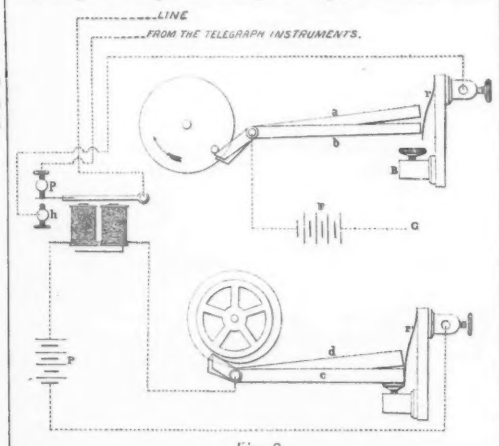


Fig. 2.

This has been attempted in various ways, but one of the most simple and reliable systems is that which has been tried for several months by the Eastern Railroad of France, and was exhibited by that company at the late Paris Exposition. For a long time all the clocks in the station at Paris have been made to keep time with the large clock on the façade by a method which requires no modification of the works of the clock. The only novelty in the apparatus shown consists in the means by which the system is made to work at an indefinite distance.

Each clock is so regulated as to have a tendency to gain, but not more than two minutes in 24 hours, and in practie it is never more than a few seconds fast. The synchronization is effected by stopping the wheels of the clock as many seconds as it is fast of the standard time, while leaving the pendulum free to vibrate. In each clock to be synchronized is an electro-magnet, on the armature of which is a forked lever, fig 1., at one end of which is a hook adapted to engage with a pin on the lever of the escapement. The other fork of the lever terminates in a straight bar, which bears against a cam on the shaft which carries the second hand. When no current passes, the armature is held away from the electro-magnet by a spring. When a current is sent through the magnet it tends to attract its armature; but this is prevented from moving toward the magnet by the end of the lever bearing against the cam, until the latter in its rotation allows the lever to drop into a recess cut in its edge. The hook then engages with the pin in the escapement, and stops the wheels until the circuit is broken, when the armature is withdrawn by the spring, the wheels are released and go on as before.

Two or three minutes before noon and before midnight every day each clock, by means of a cam on the axis of the hour-hand, closes the circuit of a local battery, which automatically switches off the telegraph instruments in the office and connects the telegraph wire with the electro-magnet in the clock. The standard clock closes a circuit through this line at 11:59. Each magnet seeks to draw its armature, and when the hands of any clock mark exactly twelve the bar on the armature falls into the slot in the cam, the hook catches on the pin, and the movement of the wheels ceases; but the pendulum continues its oscillations. At exactly twelve the current ceases and the clocks resume their movement. The system is thus perfectly automatic, and has worked excellently in the two stations where it has been tried.

The way in which the circuit is closed by the standard clock is shown in fig. 2. There are two levers, *a* and *b*, which bear side by side against the same cam on the axis of the minute hand. One lever is a little shorter than the other; they are so adjusted that at 11:59 the shorter is released, and makes contact with the spring *r*, as shown at *c*, which sends the current of the battery *P* to the line, thence to the ground, and so back to the battery. At 12:00 the other lever falls into the slot in the circumference of the cam; this is tipped with some non-conducting material, and, being slightly longer than the other, it crowds the spring *r* away from the end of the first lever and instantly opens the circuit. A switch is provided by which the agent at any station can cut off the circuit from the synchronizing apparatus should any derangement occur.

Dunkirk Engineering Works.

A new industry is developing in Dunkirk, N. Y., under the name of the Dunkirk Engineering Works. These works are building hydraulic plants under the Naylor & Armstrong patents, and the orders they have on their books and the increasing business will compel the erection of new buildings in the near future. They are now building a complete hydraulic plant for the Brooks Locomotive Works, and also one for the Pennsylvania railroad shops at Altoona, also traveling cranes for the latter shops.

These works employ about 100 men. They are situated near the Dunkirk station on the Lake Shore road. The shops, while old and a little out of date, have many good tools. Here are manufactured plate planers, varying from 16 to 20 ft. in length. There is a small foundry with a cupola of 10 tons capacity.

There are building a large traveling crane for Hilles & Jones and two smaller ones for the riveting towers for the Pennsylvania shops at Altoona. One of the new departures here is the construction of what is known as the Gilbert logging engine, of which twelve have already been built. The engine is driven by bevel gears on each axle, the driving axles being on a long longitudinal shaft. The orders on the books for these engines indicate a large future business in their manufacture.

Experimental Tie Plates—Pennsylvania Railroad.

The tie plates which are shown in this issue were designed at Altoona and have been in experimental use for more or less time on the Pennsylvania Railroad. Figs. 1, 2 and 3 show the wrought-iron tie plate, and figs. 4, 5 6 and 7 the tie plate as made in malleable iron. This is made about 8 in. long by 10 in. wide, and varies in thickness from ½ in. on one side to a little over ¼ in. on the other. It is designed to first fasten the tie plate to the rail and then spike it to the tie. This practice stops to a considerable extent the rattle of the plate and tie. It will be seen that in both forms of plate, provision is made for taking up slack by means of a bolt and nut, so that the tie plate and rail can always be held in close contact, and the theory is that any movement takes place between the base of the plate and the tie rather than between the base of the rail and the plate, as would be the case if the plate were made fast to the tie alone.

It will be seen that the plates give an inward cant to the rail. This practice is very common on European roads, and the reasons for it are obvious, viz., that it helps to take up the outward thrust of the wheel, to lessen the flange wear, and to make a better bearing for coned wheels on the head of the rail.

The rolled wrought-iron plate seems to have given

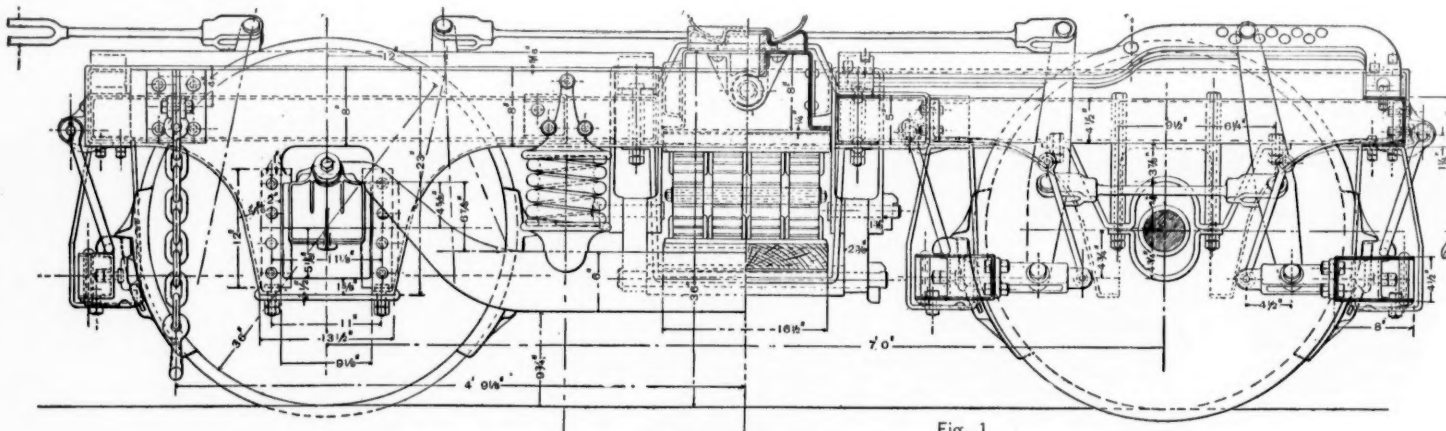


Fig. 1.

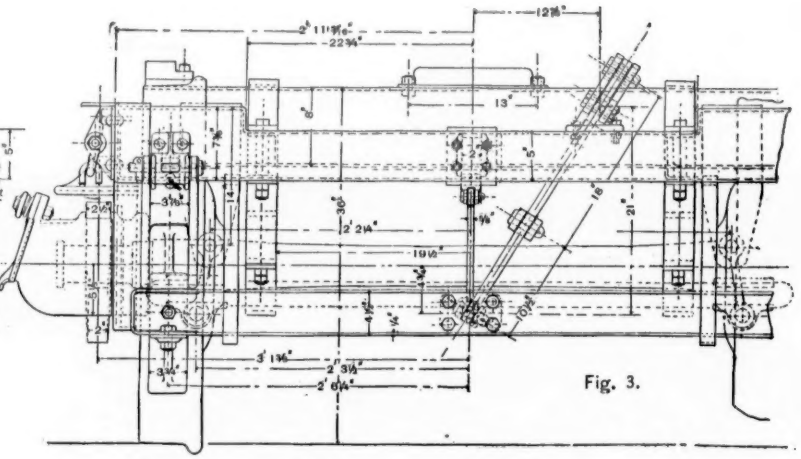


Fig. 3.

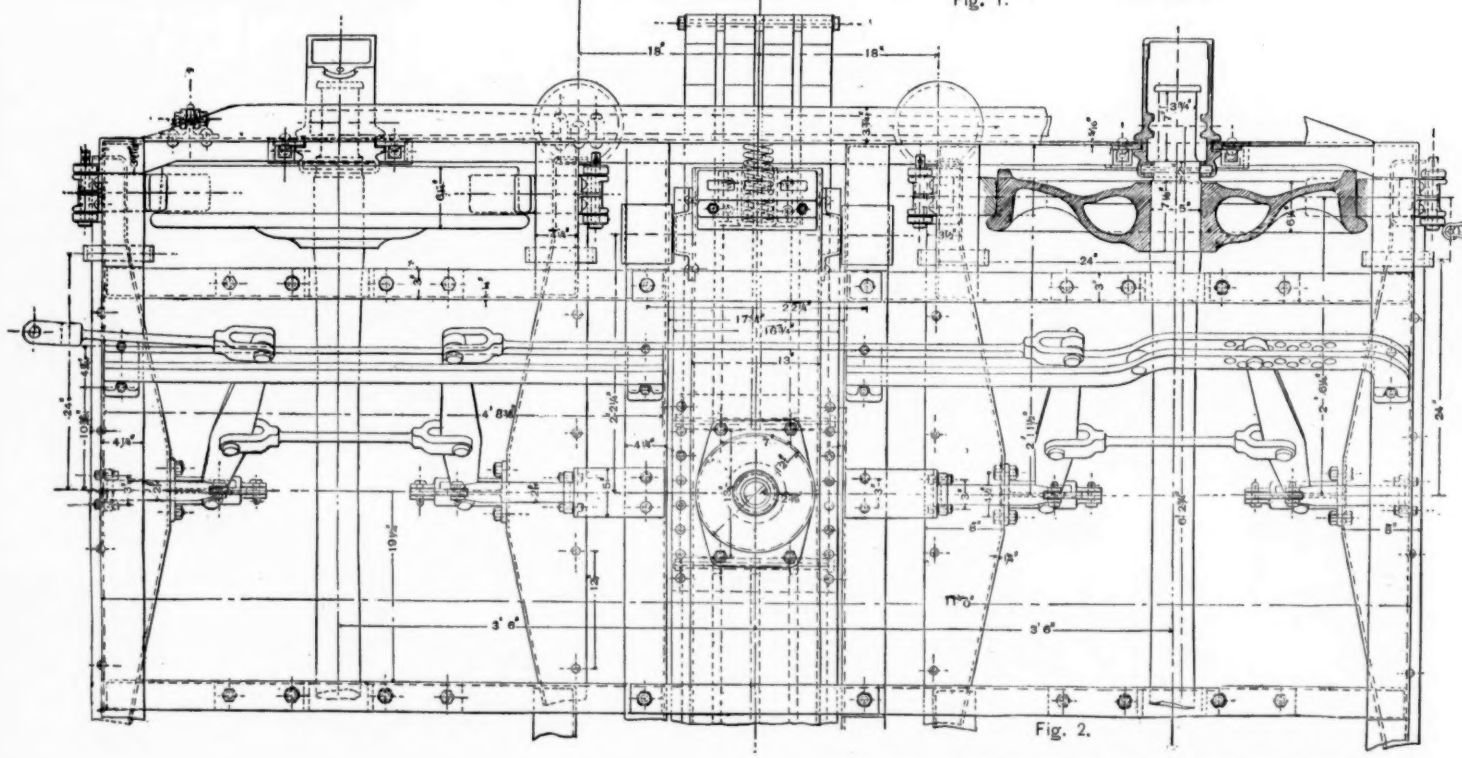


Fig. 2.

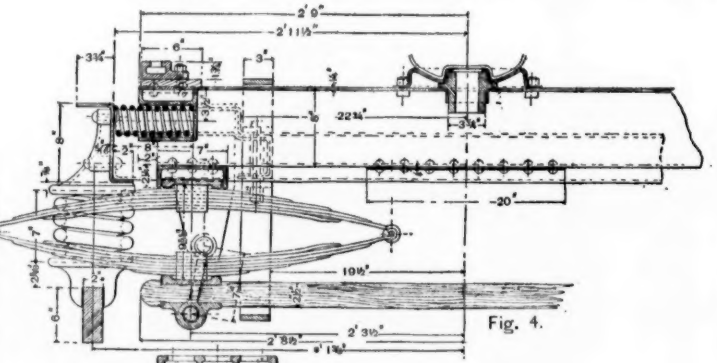


Fig. 4.

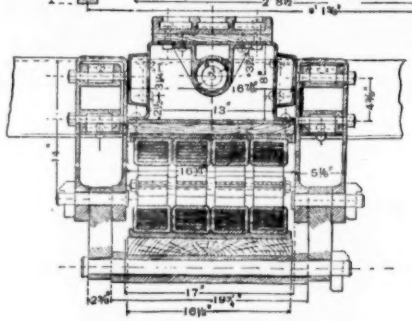


Fig 5.

THE FOX PRESSED STEEL TRUCK FOR PASSENGER CARS.

better service so far than the malleable plate. The construction of these plates is shown so clearly in the cuts as to require no further description. Fig. 5 shows an end elevation and plan view of the clip used with the malleable iron plate.

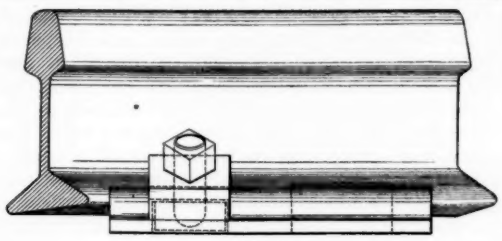


Fig. 1.

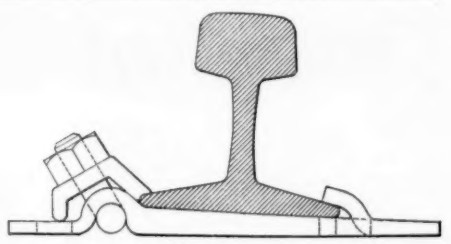


Fig. 2.

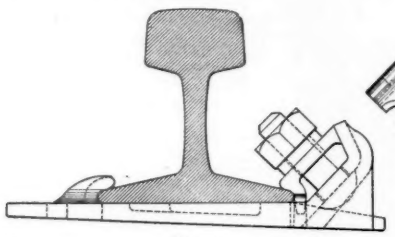


Fig. 4.

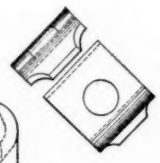


Fig. 5.

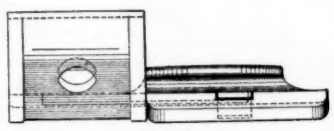


Fig. 6.

EXPERIMENTAL TIE PLATES.

PENNSYLVANIA RAILROAD.

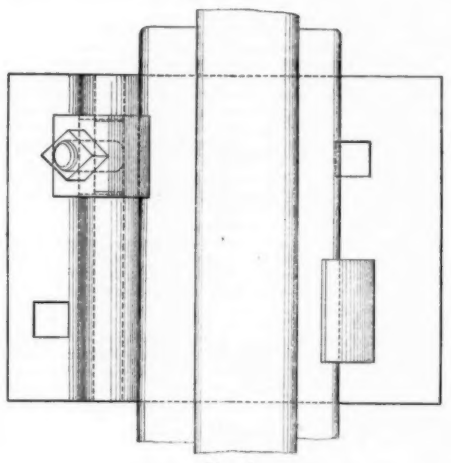


Fig. 3.

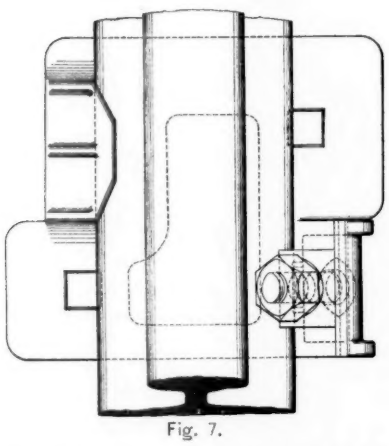


Fig. 7.

THE SCRAP HEAP.

Notes.

A newspaper item says that the Louisville, New Albany & Chicago has reduced the pay of one station agent and all his assistants (at an important station) 35 per cent. The men all resigned.

Freight conductors of the Chicago & Alton have had their pay increased and are now to receive three cents a mile. Brakemen will receive two cents. Some of the men will receive $5 to $10 a month more than formerly.

Several divisions of the Order of Railway Conductors in New England have seceded from the organization on account of the change in the constitution which permits strikes. The Philadelphia & Reading has ordered its conductors to withdraw from the order.

The Seattle Terminal Railway and Elevator Co. has let a contract to A. L. Haley & Co., of Minneapolis, to erect a grain elevator and warehouse at West Seattle, to cost $60,000. The capacity of the elevator will be 75,000 bushels and the warehouse will cost $500,000.

The Philadelphia & Reading has purchased three wharves on the Delaware River front just south of Chestnut street, Philadelphia. The wharves will be used as freight depots, the cars being transferred on floats to Port Richmond. The purchase gives the company ample facilities in a district which it has not possessed heretofore.

The Grade Crossings Commission which has in charge the changing of grade at a number of important streets in Buffalo, and which has been negotiating with the railroads for a year or more, has been reorganized under the new special law just passed, which confers upon the commisssioners largely increased powers. Chairman Robert B. Adam and Secretary William J. Morgan have been re-elected. A conference has been appointed for June 26. The new law gives the commissioners practically unlimited powers, subject only to appeal to the Supreme Court. The engineer of the board is City Engineer George E. Mann.

Unsatiated.

Charming Passenger (hugging engineer, who has taken his train over the bridge just as the last span went down)—Oh, you dear, dear, sweet, delightful man, you! You've saved our lives.

The Engineer (gasping)—Y—y—yes, ma'am; and there's another weak bridge about two miles this side of Pullout. Hope I'll see you there, ma'am.—*Puck.*

A Bulky Shipment.

The Grand Trunk had a very unusual shipment from Buffalo to California, and three big flat-cars were required for its transportation. It consisted of an iron steam yacht built by David Bell, and was billed to Truckee, from whence it will be taken overland 14 miles to Lake Como, upon which it is to ply principally as a mail boat. The steamer is 65 ft. long, and, with the boiler, etc., weighs probably about 24,000 pounds. Generally it is customary to ship such boats in sections, but in this case that rule was not followed. The steamer was loaded complete with the exception of the boiler, engine and other internal equipment, which were shipped separately.—*Exchange.*

A Busy Grade Crossing.

The complex grade crossing of an important street with two railroads, the Pennsylvania and the Central of New Jersey, at Elizabeth, N. J., is known as one of the worst in the country. Plans for the elevation of the Pennsylvania tracks and for other improvements, all to be done practically at the expense of the railroads, have been agreed upon by the authorities, but are stayed by the objections of property owners. Public sentiment is alive, however, and agitation is kept up. At a citizens' meeting in the Elizabeth Court House this week a committee reported that, by actual count for 72 consecutive hours in January, 600 trains passed daily over the Broad Street crossing. Four hundred of these passed during the day, and at the rate of about 35 per hour during the busy part of the day. The passage of these trains occupied 38 minutes per hour, leaving only 22 minutes for pedestrians and vehicles to cross. Vehicles to the number of 2,600 daily, or 200 per hour during the busy hours, were counted. The Broad Street crossing, 12 hours out of the 24, is occupied by trains, and the average time they take in passing is one minute 18 seconds. The quickest time is 30 seconds by express trains, while freight and coal trains consume nearly three minutes. A resolution was unanimously passed that the meeting approve of the amended plans providing for raised tracks, which was proposed by the Railroad Committee to the City Council, and urged its acceptance by that body.

Wonder if Canal Boats are to be Put on.

The Chicago, Milwaukee & St. Paul will be the first Western road to put in track tanks. It is stated that such a tank 12,000 ft. long will be put in half way between Chicago and Milwaukee.—*Railway Review.*

Locomotive Building in South Australia.

There was some excusable rejoicing at Gawler, South Australia, on April 11, when Lord Kintore started the first locomotive manufactured in South Australia. The manufacturers are James Martin & Co. (Limited), a local firm, which some time ago entered into a contract with the Government for the supply of 52 locomotives, the lot to be delivered inside seven years.—*Colonies and India.*

The Day After the Horror.

Newspaper Man—I have called, Mr. Wayup, to ask——

Railroad Official (stiffly)—We have had no news of any accident on our line, sir.

Newspaper Man—To ask for a pass to San Francisco and return.

Railroad Official (cordially)—With pleasure, Mr. Longquill. Self and wife, I presume?—*Chicago Tribune.*

Pacific Railroads in Congress.

There seems to be little chance of any legislation for refunding the Pacific Railroad debt at the present session of Congress. Congressman Wallace has done what he could to promote a settlement, and will join with Congresman Miles, of Connecticut, in the majority report. The feeling against the roads seems stronger, however, than it has been for several Congresses. The same influences which create hostility to the banks and to the moneyed interests of the East intensify the feeling against the railroad corporations, and the idea seems to prevail that to defeat anything a railroad is willing to accept is to do some service to the public. This is the position which the demagogues in the House have taken for some time, and at present they are more resolute than ever. There is little probability that Speaker Reed would be willing to give time for the consideration of the Funding bill in view of the varied degrees of hostility which will be arrayed against it. The Senate might be induced to pass the bill which Senator Frye has reported, but it has so much work ahead that it probably will not consider the measure in the absence of favorable action by the House.—Washington Correspondent *Springfield Republican.*

Mr. Arthur's Views.

At a meeting in New Haven last May 25, at which 1,000 engineers were present, and which was addressed by C. M. Depew, C. P. Clark and W. H. Stevenson, Chief P. M. Arthur said: "There always will be differences between capital and labor. My idea of the best way to settle these differences is in the langnage of the Bible: 'Come, let us reason together.' When employers have been willing to meet us and discuss matters with us, there never has been a strike, and there never will be. There is no man invested in our order with authority to order a strike. Such authority is fatal. I hope the time will never come when any order will hesitate to strike if such action becomes necessary, but every means to avoid a strike should be adopted. I am opposed, and always have been, to our men forming alliances with other labor organizations. I attribute our success to our policy of minding our own business and keeping out of all other labor entanglements."

A Transvaal Railroad.

A railroad, 15 miles long, between Johannesburg and the Boksburg coal mines was opened on the 17th of March last. The first train, which apparently started at 5:30 a. m., consisted of an engine, a "truck," two first-class and one second-class carriages. It made 12 miles an hour over the distance. The carriages are constructed on the American plan, and are without cushions or decorations of any kind, except brass headed nails, there being more of these in the first class cars than in the second. The *Golden Age* calls attention to the fact that the officials on the line do not as yet wear any particular uniform. The guard, or conductor, is distinguished from ordinary mortals in the state by being entrusted with a bell-punch, similar to the mysterious instruments used by 'bus conductors in England and elsewhere. Passengers on the "Randtram" are provided by him with tickets, thus dispensing with the ordinary system of booking at each station. This road was built to supply Johannesburg with coal, that from the Boksburg mines being available both for ordinary uses and for gas making.

Railroad Building in Jamaica.

Since the first of the year things have changed considerably in and about Porus. Then work on the railroad had not been begun; now upward of a thousand negroes are at work and in consequence yams, the staple article of food, have gone up in price. The first section of two and a half miles is approaching completion and work is under way on the second section. A number of bridge and culvert abutments are up, built entirely of concrete. It would strike a person ignorant of the country as rather strange to see so many waterways staked out in places, not only where there are no streams, but where the work is actually delayed for lack of water to mix the concrete. The rainy season that is coming on will tell a different story. The mild manner of "driving" laborers, and the blank and unconscious manner of receiving the driving, afford a striking contrast to railroad methods in the United States; as does also the way in which material is handled. Carts are dispensed with. Men fill square boxes, which women, for the greater part, carry off on their heads and empty. The carrying of things on the head is here reduced to a science. Everything, from a sucking pig tied on a board to a can of water, is so carried. The negro who carries the transit instrument in the field at first, in the most matter-of-fact way, lifted it to his head. The water-boy carries a 30 or 40 lb. can of water thus over rocks where others are often inclined to crawl. World's Fair preparations for 1891 are going on, notwithstanding the opinion of many that it will be premature. Efforts will be made to interest American exhibitors. American road wagons, to take the place of the clumsy mule drays used here, could be exhibited with advantage; as could machinery for preparing fibre for rope from plants with which the island abounds.—Correspondence *New York Tribune.*

Siamese Railroad Projects.

D. A. Forrest, an English tourist, in speaking about Siamese railroads, said, recently, at Chicago: "As in all countries of the Far East, the question of railroads is the most important one at present in Siam. While there not long ago I was told that a survey was being made by English contractors for a main line to Chiengmai and various branches from this trunk line. The total distance is about 900 miles. The line is to be located before March 1 next. The average cost per mile of the survey is not to exceed $500. The engineers had already presented their report of the survey of the first section. It is 45 miles long, and runs from Bangkok to Ayuthia. This survey cost only $245 a mile. This survey is approved of by the government, though it will not build the line. English contractors are scrambling for this work, but they don't seem to be successful, for, while the Siamese government does not want to build the line at present, it does not want it constructed by foreign capital. A small contract has been let to a Siamese company.

New Passenger Station in Brooklyn.

The Brooklyn, Bath & West End and the Prospect Park & Coney Island roads are spending $500,000 on a new station and yards at the Thirty-sixth street terminus (Thirty-sixth street and Fifth avenue, Brooklyn, N. Y.), and when the work is completed the station will be the finest on Long Island. The building is a handsome two-story brick structure, in which there is a main waiting room 122 × 62 ft. There will be over 2,000 linear feet of platform room, and facilities for loading or unloading 75 cars at a time. The station will be lighted by electric lights and heated by steam, and everything will be provided for the convenient handling of large crowds. The Union Elevated road has just opened its line to Thirty-sixth street, and now lands its Coney Island passengers at the new station. The old station of the Brooklyn, Bath & West End road at Twenty-seventh street has been abandoned. On Sunday last the road carried 15,000 passengers to Coney Island, the largest number ever carried at the corresponding date of any year since the road was opened.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions. machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

One of the neglected duties of the Master Car-Builders' Association is to follow up with energy the matter of journal boxes and journal lubrication. The subject in general and in detail is worth the attention of the best men in the Association. A first rate committee has in charge this year the part of the subject which must first be settled, the journal box, and will no doubt advance matters. It is nine years since the Association adopted a standard box, and perhaps it is true, as a member of the Committee on Lubrication, etc., said last year, that when the associations adopted that "box, bearing key and pedestal, they accomplished one of the greatest improvements in railroad operating known in this country." Perhaps that is true, but when one sees oil and waste smoking on nearly every through freight train that passes him, and sees about 25 per cent. of the box lids off every standing train that he passes, he is bound to admit that there is room for a still greater improvement. We are quite well aware that it is not an easy improvement to make, and that is why we say that it is worth the attention of the best men in the Association.

The drowning of 13 passengers, and the injury of several others, by the precipitation of a train into San Antonio Creek, at Oakland, Cal., on Friday afternoon last, is not reported with sufficient fulness in the news despatches for complete particulars to be given, but the main points seem quite clear. A passenger train of four cars, on the South Pacific Coast (narrow gauge) line of the Southern Pacific Company, ran, at considerable speed, toward a drawbridge which was guarded by a single watchman, who had no other means of signaling than a common red flag. The engineer of the train could see the bridge but a short distance before reaching it. and seems to have been running pretty fast, there being apparently no regulation requiring him to stop. The draw was partly open, and the engine and first car ran off and were quickly submerged. There were 30 passengers in the car, but the upper part of one end of it either did not go under, or soon rose above the surface, so that a a number of people escaped and were taken up by boats which quickly came to the rescue. The last two cars did not touch the water, as the bridge, in turning, caught the foremost one and held it. A coroner's jury found the engineer guilty of manslaughter. How fast he was running, or what palliation of his guilt there may be, we do not yet know. The jury also says that the railroad company does not use sufficient caution in signaling trains. If the facts thus far given are correctly stated, this is undoubtedly true, and is a very mild way of stating it. It is true that failures to stop for open draws are very rare, even where the signaling arrangements are of the crudest form; but the fact that when such disasters do occur they are likely to be of the most horrible description, and that the most perfect means of providing against them are simple and well known, should be so fully recognized by everyone as to leave no question concerning the gross negligence of any railroad company which continues to run heavy passenger trains over unprotected draws. The most approved form of signal, with a distant signal far enough off, both properly interlocked, are used in scores, if not hundreds, of places, and must be familiar to every railroad officer. The value of derailing switches is possibly, in some cases, somewhat neutralized by the new element of danger which they introduce, but they are nevertheless such an important safeguard that their non-use is inexcusable, except after the most careful survey of the ground. If a derailing switch is needed anywhere it is at a drawbridge. It may be questioned whether a company, which claims to be financially unable to put in interlocking at such a place, should be allowed to transport passengers at all.

The Master Car Builders' Association.

As a matter of course some one will find fault with any human institution, and the Master Car Builders' Association cannot be an exception to this universal rule. What it has done and what it has not done, and its methods of doing or not doing things have always been criticised and always will be. In the last year, however, we have frequently heard a complaint which deserves some notice. It is that the Association has passed its usefulness; that it has become unwieldy; that it is increasingly difficult to get careful consideration of and action upon subjects of great importance. This general complaint, in more or less definite form, is made by some of the brightest and most influential men of the Association—men who have long been identified with it, and who have taken an active part in its useful and honorable work in the past. If it came from men of less weight we should not notice it.

We should hate to believe that the complaint is a just one. If the Association is losing its capacity for useful work, or its influence as a conscientious, enlightened and representative body, the loss to the railroads, and through them to the nation, is a very serious one. We believe that any such deterioration is more apparent than real. It cannot be expected that the work done from year to year will be equally important or brilliant. Such great problems as those of the freight train brake and freight car coupler do not come up every year. In dealing with these two subjects the work of the Association culminated. Nothing else so striking has come up since, or is likely to come up for a long time. The work of the Association in both of these matters was practically ended in 1887. It only remained to adopt in 1888 the final reports of the committees; therefore the work of 1888 and 1889 appears by contrast to have been unimportant, and that likely to be done in 1890 will be no more impressive. But the let down is only apparent: it is simply a return to the normal level.

In fact, the work of 1889 would have been remarkable in any year of the Association's history. The report of the committee on brake gear was a document of which any body of men might be proud, and the adoption of the standards recommended is certain to have a lasting influence on air brake practice. The form of guarantee and specifications for chilled wheels was another excellent piece of work. Apparently the effect of it will be felt very gradually, but that is necessarily true of almost any standard that can be adopted. The adoption of a standard axle for 60,000-lb. cars was another important step—the culmination of a good deal of work and discussion. Those with some other standards of details made a year's work which suggests no decline in the vigor of the Association.

To those who have been in the thick of the work of the Association for years past the things accomplished from year to year must often have seemed as small, and the inertia of the organization as discouraging, as they seem now to some of the more energetic or progressive members. Nevertheless, a review of its history shows a mass of work done that has been, and will be, of inestimable value.

We have already spoken of the investigation of couplers and air brakes. It is well known that the result was reached only after years of effort, much of which seemed fruitless; but hardly any one doubts now that the delays were necessary and that the result is worth all it cost.

To go back much further: Very early in its history the Association took up the rules of interchange of freight cars; and it is still working at them. Perhaps the machinery for formulating and establishing these rules has been unnecessarily cumbersome, and perhaps some smaller body could have made them more perfect than they now are. But there was no other body to struggle with the subject, and the rules, incomplete as they still are, have been worth to the commerce of the country all that the M. C. B. Association has cost in time and money.

In 1872 the idea of the Car-Builders' Dictionary began to take form and in 1880 the committee reported its work done. The money value to the railroads of this work can have been but a trifle compared to that of the rules of interchange, but the harmony in terms has been a constant convenience, and the book became at once and remains a standard of reference.

In 1872 the Association took another step toward harmony in practice by recommending the Sellers system of screw threads, bolt-heads and nuts as a standard. This was followed in the next 10 years by the establishment of limit gauges for round iron, and by wheel and axle gauges, all of which have led to accuracy and uniformity in shop work. Many standards for parts of cars have been adopted by the Association, and so widely used as to improve original work and greatly lessen the cost of repairs. No one of these steps has been as important as the work of the Association in the matters of the brake and the coupler, but in the aggregate they have had a wide and enduring influence on railroad practice.

But the influence of the Association does not stop at the standards adopted. This is but one part of the service that it has done for the nation. The reports and discussions, inconclusive and ill-prepared as they have often been, have, in the aggregate, embodied a great mass of practical knowledge, and have been a stimulus and an aid to many who have studied and worked in the same field, and the results of whose labors do not appear in the reports of the Association.

Such, very briefly, have been some of the uses of this Association. We see no reason to believe that it will not go on in the same career of usefulness and with much the same organization. We do not say that the work of the committees and of the conventions might not be improved by some changes in methods. On the contrary, we think it might be; but there seems to be no reason for any radical change in organization or administration.

Master Car Builders' Coupler Breakage

On another page will be found an important paper on couplers by Mr. Herr, an officer of the Chicago, Burlington & Quincy, with diagrams showing breakages of M. C. B. couplers on that system. The diagrams are from photographs, giving the complete record of the breakages from 1,184 couplers up to date. The only part of the record that we have not thus reproduced is that of seven knuckles worn out in passenger service. This part of the record is of the least immediate importance, for, except on tenders, the wear of knuckles in freight service is slow and is apparently an insignificant cause of failure as compared with other causes. In passenger service this element is very important. Nearly all of the failures in that service have resulted and will result, either directly or indirectly, from wear, for two reasons. One is that there is a constant grinding action on the knuckles resulting from a necessity for movement under the heavy pressures of the draft spring; the other that in passenger service there are few shocks and the life of the device is limited by its resistance to wear.

Some time since, after carefully watching for considerable time the wear of knuckles in ordinary passenger service, we came to the conclusion that when the buffer springs are maintained, as originally intended, the wear on the locking pin and on the interior face of the knuckle would be considerable; but were not prepared for the great wear which results when these couplers are put into the best class of passenger service where vestibules are used and the buffer springs of high capacity. One-half inch wear brings the knuckle to a questionable condition, and five-eighths of an inch is as much as in any case ought to be allowed, and this never in fast and heavy trains. Some of the knuckles, shown in the photograph not reproduced, were worn well into the pin hole, and the train slack in such cases would be about 2¼ in. between each car.

The part of Mr. Herr's paper which will attract most attention is his discussion of the relative cost of maintenance of the vertical plane and the link and pin coupler, and as immediately bearing on that question we call attention to another article in this issue, that on the Janney coupler, showing one of the abuses of the knuckle. On this point there is still a wide difference of opinion, and it is yet too early to give figures that will stop discussion. But the M. C. B. coupler is being widely adopted by many who still believe that it will cost more than the link and pin to maintain. The attitude of these men is thus stated in a recent communication:

> It is unreasonable to suppose that any device having a number of parts connected together with pins and joints, and applied to the rough usages which obtain in freight car service, and which cost $25 per car, can be maintained for the same amount that a malleable iron link and pin draw head, with good strong links and pins, can be maintained, when the latter connection costs less than $7 per car. Further than this, the link and pin device, while wholly unsatisfactory, and so crude that it cannot be used any longer in the best class of freight

service, is the simplest of all connections yet proposed to be used between cars. It is, in fact, simplicity in itself, and when properly constructed of malleable iron for the head, and good strong steel links for the connection, the cost of maintenance should be, and probably is, lower than any other form of connection which has ever been proposed; but however this may be, something better must be had, and the vertical plane type of coupler offers features which no other coupler has, and that type has come to stay. It is an improvement and a betterment, and it is not unreasonable to ask that a larger amount of money should be forthcoming for its maintenance. Even at double the cost of the link and pin, it must be used, and at double the cost of maintenance it is much the cheaper in the end.

In the diagrams it will be noticed that the majority of the breakages are of the horns and lugs. That the breakages do not always occur in the same place does not signify that the coupler is equally strong at all points, and that it is not uniformly strong is seen from an inspection of the designs. Such a lack of uniformity as here shown in the location of fractures always results in any material where the stresses are brought about by blows. Those couplers that have been pulled in the testing machine under a gradually increasing pressure have broken uniformly in nearly the same places.

It is not reasonable to lay at the door of the vertical plane coupler the broken stems, because the stem of a drawbar is the same for a link and pin, and can easily be made stronger, if necessary, by adding internal ribs of sufficient dimensions to just clear the head of the tail bolt when tail bolts are used. It might be argued that the breakage of coupler stems is the result of blows delivered in such a way on either the horn or the lugs of the coupler as to cause a lateral bending moment which fractures the stem; but the same is true of the Potter drawbar, with which the vertical plane coupler has been compared, and therefore it is no more than just that failures of vertical plane couplers caused by breakage of the stem should not be counted among the failures in the essential features of design.

Many of the top and bottom lugs of the knuckles are broken off at the base of the lug, evidently as the result of a blow. Most of the breakages indicate from examination that the material used has a high resistance and less ductility than might be supposed to be best; but there is a strong argument in favor of using such material, because when material such as wrought iron of low resistance and high ductility is used it is found that the lugs bend in to such an extent that they will not couple, and yet do not break. The number of failures of vertical plane couplers would be slightly increased, if there were included cases where the knuckles have not broken, but have been bent inward so that they would not couple with each other.

Red and Green Tail Lights.

The Southern Pacific (Atlantic system) has just reprinted its book of train rules, and in so doing has abolished the use of green markers for the rear of trains when running, rule 33 reading, "Two red flags by day and two red lights by night, as markers." Rule 74 says that green must be displayed in place of red as soon as the track is clear. The Southern Pacific has used the standard code for some time, and we understand makes this change because the use of green signals was of no special value, and, moreover, sometimes gave engineers an excuse for carelessness at meeting points. If an east-bound train, for instance, should be partly on the side track at a meeting point, and the headlight were obscured by cars in front of the engine, a west-bound engineer, seeing the green light on the caboose, could assume that the main track was clear and proceed at a faster rate than the conditions warranted. It seems that a number of other roads have made a similar change in the standard code. We understand that these roads act on the theory that green tail signals are of no special benefit on single track roads and that their use was first introduced, and was endorsed by the Time Convention, for the benefit of double track lines. It is doubtless true that double track roads receive the most benefit from the combined signals; and it is also true that, in order to secure uniformity on the whole of a road whose lines are part double track and part single track, green markers should be used on single track even if they are not specially important there. It may be said with almost equal force that, in order to preserve uniformity throughout the country, roads which are wholly single track will have to make some slight sacrifices to conform to the customs of double track roads. The latter class have for years continued practices which were not absolutely essential to safe and efficient operation, but which served to maintain a convenient uniformity between the two classes of roads. Moreover, we understand that one of the principal objects in using green markers while running is to insure that they shall be regularly and unfailingly displayed when trains are on side-tracks. Rule 74 is much more likely to be carefully obeyed if the green signals are already in position than if the brakeman has to fish out a dirty flag or a frozen lantern from a box inside the caboose.

It is true that the diagrams appended to the standard code provide for a tail light which shows red to the rear only, but the text of the rules themselves does not specify such a form of lamp, and we see no great objection to the use of common lanterns, which throw a red light in all directions, if a road prefers to use them. The principal reason for not showing red to the front is to avoid confusing engineers moving in the opposite direction, but it may be said that there are no such runners to be confused on a single track road, and the practice of the Southern Pacific probably involves no element of danger. The hiding of red lights when they should not be seen by engineers can at best be accomplished only partially, and this instance is no worse than others. But if the tail lights of a train are to serve as a stop signal to the engineman of a train in the opposite direction, the red should show conspicuously towards the front of its own train (as well as towards the rear) until the main track is wholly clear. If the red lights are sufficiently large and placed in the proper position on the caboose, there would seem to be no excuse for an engineer seeing the green and not seeing the red, and the use of a red light which shines both to front and rear should not therefore be a reason for abolishing the use of the green. The sensible rule for an engineer at a meeting point is, however, Never assume that a train is wholly upon the side track until the switch is seen to be set for the main track, *and the track to be clear.* In fact this is prescribed in Rule 93. If this rule causes unreasonable delay, the only admissible modification is to allow the trainmen of the side-tracked train to give hand motions to the engineer of the other train.

A Misleading Quotation.

It is not quite a year since the Hungarian State Railroads made a sweeping reduction in passenger rates, to which we have more than once alluded. The experiment seems to have been successful; at least the effect on gross earnings has been favorable. Whether the net earnings will make as good a showing remains to be seen. The advocates of state railroad ownership point with pride to this result, and hold the Hungarian roads up as an example to those of the United States. They quote with triumph a passage from a paper of Dr. E. J. James before the American Academy of Political and Social Science, which reads as follows:

"How radical a change this system involves can be seen in the extreme cases. . . . The rate per mile from Buda-Pesth to Kronstadt, for example, is 63, 46 and 32-100ths of a cent per mile for the three classes respectively. If we had the same rate in this country, it would be possible to buy a railroad ticket to Chicago from New York for $2.92. The fare from New York to Philadelphia would be 29 cents."

What are the actual facts?

1. The lowest possible rate, under the Hungarian tariff, from New York to Philadelphia, instead of being 29 cents, would be 90 cents.

2. At this 90-cent rate a man could make the journey from New York to Philadelphia without baggage, and with no cushions on the seats of his car, in four hours and a half. If he wanted baggage, or cushions, or speed, he would have to pay extra for all of them, at very high rates.

The fact is, that Dr. James' language conveys an impression totally different from anything which the facts warrant. His case, instead of being an extreme one, is to all intents and purposes a fictitious one. He takes an exceptional case, and treats it as if it were a standard per mile; and not merely that, but he applies this standard as a basis of comparison with cases to which it would not be applied in Hungary. He might just as well take some of our commutation traffic, which goes as low as a quarter of a cent a mile when a man uses his season ticket both ways every day, and make that his standard mileage rate for purposes of comparison. It would not be nearly so exceptional as the traffic which he takes for his basis in Hungary. To be candid, he should have said: "If we take one exceptional and unimportant case in the Hungarian tariff and apply it to another class of cases where the Hungarians themselves never think of applying it, the fare from New York to Philadelphia would be 29 cents." But this is very different from what he actually says. The impression made on the reader is that the Hungarian system would give the low rate quoted as a natural result.

We should not lay so much stress on this, were it not for the fact that it illustrates a tendency, too common among the advocates of state railroad ownership, to select statistics unfairly. Ordinarily, this does little harm. It was gravely asserted by one writer on that side a short time ago that if railroads were properly managed the fare from New York to San Francisco would only be a dollar, and that everything above this was sheer extortion. He made a show of proving it, but of course nobody believed him. When, however, an economist of Dr. James' standing makes misleading statements, people will believe them, and this makes his responsibility much greater. It is not enough for him to show that he did not directly tell an untruth. If he contrived to give a false impression, by sentences certain to be misunderstood, it shows a want of candor which is as bad as any want of accuracy possibly could be.

The Canadian Pacific Report.

Most of the facts contained in this report have been for some time before the public, but they are so remarkable that they will bear repetition. The figures of earnings for four years are as follows:

	1886.	1887.	1888.	1889.
Passengers	$3,170,713	$3,453,818	$3,800,883	$4,520,241
Freight	6,112,379	6,924,130	8,017,313	8,852,702
Mails	205,024	241,949	263,344	344,834
Express	206,872	235,035	244,247	242,806
Parlor and Sleeping Cars	118,658	176,826	187,694	239,103
Telegraph and Miscellaneous	268,154	574,653	682,052	830,972
Total	$10,081,803	$11,606,412	$13,195,535	$15,030,660
Expenses	6,378,317	8,102,294	9,324,760	9,024,601
Net Earnings	$ 3,703,486	$ 3,504,118	$ 3,870,774	$ 6,006,059

In other words, the net earnings, which in previous years just about paid fixed charges, showed a sudden increase. Deducting the fixed charges of $3,779,133, the profit for the year was $2,226,926; and, after payment of a supplementary dividend of 1 per cent. in addition to the government subsidy, the surplus for the year was $1,576,926.

What is, perhaps, still more remarkable is that this enormous increase in earnings has been accompanied by a reduction in charges, especially on freight.

	1887.	1888.	1889.
Number of tons carried	2,144,327	2,496,557	2,638,690
Number of tons carried one mile	687,786,049	784,972,511	967,508,450
Earnings per ton per mile	1.006 cents.	1.02 cents.	.915 cents.
Number of passengers carried	2,057,089	2,280,049	2,638,690
Number of passengers carried one mile	174,687,802	212,766,865	253,905,182
Earnings per pass. per mile	1.98 cents.	1.79 cents.	1.78 cents.

So striking are these results that many observers have claimed that they were unfairly obtained; calling attention to the fact that there was a diminution in operating expenses in the face of a growth of traffic and earnings. This, it is said, could only be achieved by unduly depressing maintenance charges. The figures do not altogether bear out this view of the matter. It is true that expenses for maintenance of way are less than for the previous year, but not overwhelmingly so. There has been a reduction on motive power also. We must look for some other causes to explain the facts properly.

If any one looks back to the history of our own western roads ten years ago, he will remember how great was their prosperity under the conditions then existing. In one sense it was real; in another it was exaggerated in men's minds. It was real because the showing represented existing facts correctly enough; it was exaggerated because it was based on a state of things which could not continue indefinitely. Maintenance charges were low because the roads had been put in first rate condition two or three years before and the fixtures had not had time to wear out. Earnings were high because the country had not been filled up with railroads, and each company was sure of a great deal of long-distance traffic. Both these advantages were real as long as they lasted; but each, in the nature of things, was only temporary.

We imagine that this is pretty nearly the case of the Canadian Pacific to-day. The company is paying only $500 per mile per year for maintenance of way, against $750, for instance, on the Northern Pacific. Yet it may be that this for the time being is all that is really required. The error would come in if we assumed that what is now true would always be true. Other items in operating expense which seem small may be explained by the exceptional conditions of haul. The average freight haul on the Canadian Pacific is about 370 miles; and, what is more, it is increasing from year to year. Under these circumstances increased ton-mileage does not necessarily mean increased expense nor do diminished ton-mile earnings mean narrowed margin of profit. In point of fact, the tonnage has increased but slightly, and the earnings per ton are higher than they have been, instead of lower. With a road whose track capacity is so imperfectly utilized as the Canadian Pacific, the increase of length of haul counts for very little; if better train loads can thereby be secured, it is practically no expense at all. Just what the

facts are in this last respect it is impossible to tell, owing to the want of information as to train mileage in years past. For 1889 the load was 162 tons.

The increase in long-haul business can go on as long as the Canadian Pacific preserves its virtual monopoly Nominally, this has been broken down; practically it is still rather difficult for our roads to build across the line in the northwest, except in the immediate neighborhood of Winnipeg. This is partly due to national feeling and partly to the far-sighted policy of the Canadian Pacific directors, who buy up for their own road, such promising independent enterprises as that in the Kootenay country. Of course, this monopoly must come to an end in time; but it may be some time before the end is reached.

The government of New South Wales has accepted an offer of an English and colonial syndicate to establish locomotive building works in the colony. The capital of the company is $600,000, and they guarantee that the workmanship and materials of the engines they build shall be equal to those of the best English builders. The works are to be commenced at once, and 100 locomotives are to be delivered within 30 months. The majority of the machine tools, cranes, plant, etc., are to be imported from England. Three standard types of locomotives will be built, one for main line traffic, capable of hauling either freight or passenger trains over the ruling grades of 132 ft. per mile. These engines will be six-coupled inside-connected tender engines. Another type will be tank engines for suburban passenger traffic with four coupled wheels and four-wheeled track under the leading end; while the third type, for local coal traffic and switching, will be also tank engines but with six coupled wheels and a rear truck. All engines will have copper fire-boxes and brass tubes. The price of the tender engines will be 14.7 cents per pound weight of engine and tender empty, while the tank engines will cost 15.5 cents per pound; the price of future orders to be upon this basis, subject to a sliding scale based on the current market prices of steel, copper, spelter and Yorkshire iron. The resident managing director of the new company will be Mr. D. Drummond, for many years the locomotive superintendent of the North British and Caledonian railways. The price at which the engines are to be furnished is materially higher than the prevailing rate in the United States, about eight cents per pound, but is stated to be lower than that obtained by locomotive building firms in other Australian colonies. Mr. Drummond is an engineer of established reputation whose aim has always been to secure the greatest possible durability in locomotives by using the best materials and workmanship, finding that the diminished cost of repairs more than repays the increased capital outlay in the first instance. It will be noticed that, while the details of the engines will be in accordance with English practice, their flexible wheel base and power will accord with those found most profitable in the United States, the aim being to secure a durable engine of great tractive power and consequent considerable earning capacity.

The new "North Shore Limited," which runs from New York to Chicago over the New York Central and the Michigan Central, and is scheduled at 25 hours for the 960 miles, made a remarkable run on May 26, when, having been delayed 2 hours and 32 minutes at Whitesboro, N. Y., it traveled from Suspension Bridge to Chicago, 511 miles, in 11 hours and 41 minutes, reaching Kensington, 14 miles out of Chicago, only 20 minutes late. On one division no time was made up, so that the other three have the credit for the whole of the gain. In one instance a distance of 61 miles was traversed in 58 minutes. The train is considerably heavier than most of those which have heretofore made so good a record as this. It appears that on its first eastbound trip this train made up 99 minutes in 226 miles. The eastbound time is, however, not quite so fast as the westbound.

NEW PUBLICATIONS.

Air Brake Practice. By J. E. Phelan, Division Superintendent, Northern Pacific R. R., etc.; pp. 107, with folding plates. Published by *The Locomotive Engineer*, New York. Price $1.25.

Mr. Phelan's book on air-brake practice is got up in very convenient form for locomotive engineers and others for whom it is designed. It is bound in pocketbook form, and has the excellent feature of the plates being separate as folders and placed in a pocket, so that they can be easily referred to and replaced if destroyed or lost.

This work is of a special interest, as treating questions in air brake practice from a standpoint of practical railroad experience, Mr. Phelan having been for a time in personal charge of air brakes and afterward indirectly, as Division Superintendent of the Northern Pacific Railroad. Hitherto about all the air brake literature has been scattered through the technical papers or has been issued by the Westinghouse Co., and while that company has facilities for acquiring a large amount of information in regard to the practical operations of its brakes, nevertheless this work is a most important addition to air brake literature, as coming from the standpoint of the user, and conveniently summing up the recent knowledge and practice.

The book is quite comprehensive, and includes chapters upon the calculations for levers for both locomotives and cars. These calculations are practically the same as those set forth and recommended by the Westinghouse Air Brake Co. Several chapters of the work are descriptive, explaining the details of the apparatus, both as to construction and operation, and trace the development of the apparatus from its early forms, displaying, in a comprehensive manner, the difficulties encountered with each form in practice, and the causes of the changes in parts. The development of the original three-way cock, for the use of the engineer in handling the brake, into the present form of engineer's brake and equalizing discharge valve, is especially well considered. The descriptive portion of the work is not as full as we should wish.

The results of Mr. Phelan's experience in the use of the locomotive driver brake in connection with the train brake confirm the wisdom of the Westinghouse Co. in urging the automatic use of driver brakes for all stops. This is a matter which has caused considerable discussion, and opinions still differ in reference to it. The gratifying results obtained on roads where the driver brakes are used in this manner would seem to have settled beyond all question that, in almost all cases, this practice is highly desirable.

The principal value of the work, however, lies in the very complete and detailed consideration of the care which should be given the apparatus in practical operation. The successful use of the Westinghouse air brake may be said to depend upon three considerations:

First—The proper application to the engine and cars, due consideration being given to the position of the different parts and to properly securing them to prevent leaks from vibration, etc.

Second—The care of the apparatus, both in service and out of service, and

Third—The handling of the apparatus by the engineers while it is in use.

The care of the apparatus is treated at some length, and there is a good chapter on the location and care of air pumps. This is a matter too often insufficiently considered. The location of the air pump is often such that cinders, dust, ashes and sand are carried to the air cylinder of the air pump, where they unite with the oil of lubrication to stop up the air passages, causing the heating of the pump and great difficulty in communicating the proper air supply to the train.

In the consideration of air brake practice, while the brakes are in service, the burden of responsibility is distinctly brought out as resting with the engineer. Nearly all the difficulties encountered in the operation of the brakes are attributed to the ignorance or unskillfulness of the engineer, who should study both the construction of the apparatus and its operation, that he may be thoroughly informed as to what effect each movement of the engineer's valve has upon the apparatus throughout the train. Such study may be materially helped by the use of sectional engineer's and triple valves, and especially is the use of instruction cars containing these parts, and all other apparatus used in the complete brake system, urged upon railroad officers. The causes leading to inefficient action of the air brake under different circumstances; the so-called "failures of the air brake," and other annoyances connected with air brake practice, are considered by Mr. Phelan, and point, with hardly any exceptions, to the poor judgment of the engineer.

The heating of the air cylinder of the air pump, especially on long trains, is traced to its causes. These are principally: First—Using abnormally high air pressure in the train, causing the pump to become heated through excessive atmospheric compression. Second—Pumping too rapidly, causing unnecessary friction of the parts and rapid production of heat in compression of the atmosphere. Third—The use of bad oil for lubrication in the air cylinder, or too much oil for the same purpose, producing gum, which gathers in the parts, clogging them up, causing a high resistance to the passage of the air from the pump to the train apparatus, and thereby an unnecessarily high pressure, and consequent heat in the air cylinder. The too rapid operation of the pump is due to a waste of the air in the train pipe apparatus from some cause or other. If the apparatus is properly cared for, this waste of air is invariably due to the engineer's careless use of the brakes.

The instructions given to the engineers by Mr. Phelan in reference to the economy of the use of air cannot be too warmly commended. Those uses of the apparatus which imply waste of air almost inevitably imply also rough stops and frequently waste of air in the release of the brakes. He points out that, especially in the use of the new engineer's brake and equalizing discharge valve, the engineers often lack confidence in the apparatus. It has been customary with short trains, using the old apparatus, for an engineer to reduce the train pipe pressure until he could feel the checking effect of the brakes upon the train. With the use of the new engineer's valve such a reduction of pressure will almost invariably result in producing a braking force upon the train, which is greater than required, the result being that the train's speed is too quickly checked, the brakes consequently are released, and all the air which was admitted to the brake cylinders under the cars is lost. The engineer can only successfully avoid this difficulty by relying implicitly upon the fact that a proper reduction of pressure through his engineer's valve will be certainly followed by a corresponding application of the brakes, for which he must wait a trifle longer than has been his experience with the older forms of engineer's valves.

Even with the older apparatus many engineers have been accustomed to apply the brakes suddenly and with considerable force, unnecessarily checking the speed of the train, then releasing the brakes; shortly afterward repeating the sudden and forcible application, releasing again, and so on. Mr. Phelan points out the fact that such use of the brake indicates "an engineer who don't know his business." In addition to the undue wear and tear upon the apparatus, the unnecessary waste of air, depletes the force at his command for an emergency occurring in a station stop. This kind of braking produces the disagreeable effects upon the train so frequently noticed by passengers, requiring them, if standing, to brace themselves against repeated shocks.

The work, for the uses of engineers and railroad men, may perhaps be considered the most valuable which has yet been published. It should be in the hands of every engineer, trainman and inspector who has to do, in any manner, with the brake apparatus. Officers of railroads will find many useful hints in it which will throw a new light upon many vexed questions as to the reported failure or inadequacy of the air brake, and it may be confidently asserted that the book is destined to prove of great service to all who have to use the air brake, as well as to the public which rides on trains equipped with it.

Pavements and Roads, their Construction and Maintenance. Compiled by E. G. Love, Ph. D. Published by the *Engineering and Building Record*, New York.

The literature of road-making is surprisingly small, and this is partly the consequence and partly the cause of the gross ignorance generally shown in all parts of this country by those who have charge of the expenditure of public money for road building and repairs. The study of the science of road-making has not been especially attractive to engineers for the reason that the rewards are small and not comparable, either in amount or in duration of employment, with those to be received in other branches of engineering. The editor of the *Engineering and Building Record* has assiduously cultivated the few really scholarly members of the profession who have made unbiassed and thorough studies of economical pavement and road construction, and drawn from them for publication in his journal the best results of their experiences. The volume which he has had compiled from the series of papers and discussions evoked contains over 400 octavo pages of the most essential and profitable information on the subject at present available.

A Handbook of Engine and Boiler Trials, and of the Indicator and Prony Brake. By R. H. Thurston. John Wiley & Sons, New York.

A book bearing the above title must necessarily be to a great extent a compilation of rules and precedents, and its value to the student will therefore depend largely upon the skill and care which have been exercised in its preparation. Prof. Thurston's experience has rendered him eminently fit to undertake such a work, and we therefore naturally expect to find in a handbook bearing his name a very complete exposition of the best practice, and in this expectation we have not been disappointed.

The first one hundred pages are given to boiler tests, and are taken with very slight changes from the author's "Manual of Steam Boilers." The abstract includes all of that part of the former book which relates to boiler tests, including the Report of the Committee of the American Society of Mechanical Engineers on a Standard Method of Boiler Tests, descriptions of and formulas for calorimeters of the barrel, coil and Barrus continuous types, and some miscellaneous information which has more or less bearing on the subject of tests. It would seem, however, that several of the quoted paragraphs might have been omitted with advantage, as for example the method of derivation of Rankine's formula for efficiency of boilers, on pages 13 to 16, inclusive, which is reproduced in detail, including several typographical errors. Such mathematical deductions, while undoubtedly valuable in their place, have little connection with boiler trials. Again, the form in which Rankine's formula may be used in designing (page 18) is foreign to the subject under discussion. Then on page 32 we find an often published table of the number of cubic feet of space which can be heated by one horse power of boiler under "ordinary conditions." And on page 66 this paragraph:

"Where a small combustion chamber is unavoidably employed, as in locomotives, various expedients have been devised with the object of producing complete intermixture of gases before entering the tubes. The most common and most successful is a bridge wall, sometimes depending from the crown sheet, but sometimes rising from the grate, and which, by the production of eddies in the passing current, causes a more thorough commingling of the combustible gases with the accompanying air. None of these devices seem yet to have given such good results as to induce their general adoption."

Our objection to these and similar statements is, first, that they have little or nothing to do with boiler *tests*, and, secondly, that, if the subjects are to be taken up at all, they should be discussed at greater length, as, in our opinion, such brief unqualified statements by men of Prof. Thurston's standing are apt to have great weight

given to them by the student, and, therefore, lead to erroneous ideas on these subjects.

The chapter on indicators and reducing motions is good. Various makes of indicators are described in detail, and considerable space is given to the discussion of the errors to which these instruments are subject, and the methods of determining the amount of these errors. The several forms of reducing motions which are in common use are illustrated, particularly as applied to horizontal stationary engines, and the errors of such motions are discussed. The only illustration of the application of the indicator to locomotives is that used by Mr. L. F. Lyne about eight years ago.

Under the chapter heading, "Indicator Diagrams Interpreted," we find, after the customary discussion of the ideal diagram, several examples of incorrect valve setting, etc., combined diagrams from compound engines, and some interesting steam-chest, pump, and air compressor diagrams. The following chapter contains descriptions of the usual methods of measuring the area of indicator cards, by ordinates and planimeters, and of several speed-measuring devices, among which the use of the chronograph and timing fork for measuring the variations in speed during a single revolution are specially noteworthy.

About twenty-five pages are given to the subjects of engine friction and dynamometers. In these pages brief descriptions are given of well known transmission dynamometers, such as Morin's and Webber's, and the method of designing the Prony brake is explained quite clearly. Several illustrations of the application of the Prony brake in its simplest and in its more complicated forms are given. The remaining one hundred and seventy-five pages of the text are devoted to engine trials, and it is this portion of the work which will be specially useful to practicing engineers on account of the examples of forms for competitive trials and of reports which are here collected in convenient shape for reference. The reports which are given in full or as abstracts cover Corliss engines, compound condensing engines, portable engines, Prof. Coon's report on the Strong and other locomotives, Mr. Emery's well known tests of revenue marine steamers, trials of the "Anthracite," the "Lepanto," and several reports of trials of pumping engines, gas engines and ammonia engines.

The appendix contains about forty pages of tables, consisting of steam tables, mean pressures, logarithms, numerical constants, etc.

Taken altogether, this book is one which every engineer will find of value, containing as it does much information in regard to engine and boiler trials, which has heretofore been available only in the form of scattered papers in the transactions of engineering societies, pamphlet reports, note books, etc. We are pleased to find the book comparatively free from repetitions and contradictions, and in general it gives evidence of more careful editing than many of Prof. Thurston's earlier books received. There are, however, minor repetitions which could have been readily avoided, as, for example, the common formula for horse power on pages 213 and 237, the customary allowance for engine friction on pages 232 and 233, in the equations on page 241, where the symbol a is used to represent the area of piston and a constant, and the incorrect reference to figures on page 356. Such repetitions and errors are of small moment in themselves, but as they are evidence of a lack of care in preparing the text, they are likely to raise a doubt in the mind of the reader as to the accuracy of statements which he cannot readily check.

It is greatly to be regretted that the author has not given more space to the subject of locomotive trials, for, as he says: "Trials of locomotive engines are more difficult of prosecution than are those of any other class of steam engine. The conditions of its operation are such that it is very difficult to secure measurements of coal and of water consumption, exceedingly difficult to obtain a good arrangement for taking indicator diagrams, and next to impossible to determine the quality of steam made while in regular work." In the 460 pages of text there are but about 15 pages devoted specially to locomotives, and it seems to us that the fact that it is very difficult to obtain results of locomotive tests which are strictly comparable, and that there is scarcely any literature on the subject, are sufficient reasons why some effort should be made by such men as Prof. Thurston to point out possible means of overcoming the acknowledged difficulties, and to aid in establishing standard methods of tests.

TRADE CATALOGUES.

Machined Car Wheels.—The New York Car Wheel Works, of Buffalo, have issued a handsome pamphlet under the above title. In this pamphlet are explained at considerable length the steps taken by the company to solve the questions, "Can a perfect car wheel be made? If so, what must be its distinctive features?" It is claimed that this company has so far answered these questions that out of a total of 500,000 wheels made in the past five years, and put into every kind of railroad service, not one case of breakage has occurred. Every wheel made is subjected by the makers to six separate tests, and each wheel is identified in the records so that its history may be followed perfectly.

Notwithstanding the careful methods of manufacture, has been found impossible to turn out of the foundry, a mechanically perfect wheel. Even very small eccentricity results in skidding and flat spots, and a wheel as it leaves the foundry is not perfectly balanced. The New York Car Wheel Co., therefore, set to work to devise apparatus for trueing the circumference of its wheels and for balancing them. It was found at the outset that for various reasons the wheels should be finished before putting them on the axles. This company, therefore bores the wheels and then places them on a self-centering mandrel on the grinding machine. By this machine they are ground to perfect circumference. The machine is automatic, grinds two wheels at once, and turns out an average of 50 wheels in each 10 hours, with but one attendant to each machine. The cost, therefore, of grinding is very low. The wheels after being ground are balanced and corrected for balance and then gauged to diameters varying by sixty-fourths of an inch. The method of balancing is described at considerable length in the pamphlet before us. The points at which the balance weights should be applied and the amount of those weights are determined on the balancing apparatus. On the plate of each wheel small lugs are cast, each one with a ¾-in. taper hole. To these lugs the balance weights are fastened by riveting. Considerable discussion of the advantages of this process will be found in the pamphlet.

During the past year the company has made and put into service wheels 36, 40, 42 and 43 in. in diameter, weighing respectively 750, 1,000, 1,100 and 1,200 lbs. So far the result of service with these wheels of large diameter is said to have been very satisfactory, and it is believed that if these special wheels receive the same treatment as steel-tired wheels they will be found cheaper and even more serviceable.

The company has also devised and uses and manufactures for sale a chilled reamer for boring car wheels, which, it is claimed, is more economical and gives better results than the ordinary steel cutters. This reamer has six cutting faces, each 4 in. long. In ordinary practice from 20 to 30 wheels can be bored before the edges which first engage in the work require sharpening, and from 150 to 200 wheels can be bored before the edges need to be sharpened through their entire length. Some of these reamers have bored upward of 2,000 wheels each. The whole pamphlet will be found of considerable interest and value to those who have to do with the purchase and care of chilled wheels.

East Tennessee, Virginia & Georgia Railroad.—General Passenger Agent B. W. Wrenn has issued a map of the lines of this road, with their connections branching out to the different points of the compass, which is got up in quite unique and effective style. The map is represented hanging in the midst of a variety of attractive Southern scenes, and the handsome Wrenn himself, standing on a block of Tennessee marble, surrounded by the mineral and vegetable products of the soil of the various Southern states, draws the reader's attention to the most conspicuous points on the map. The cartoon is by Thomas Nast, and represents, among other scenes, a Florida seaside hotel, mountain resorts in Tennessee and Virginia, and views of the typical industries of the Southern states. The map is printed on cardboard suitable for framing.

TECHNICAL.

Manufacturing and Business.

During the past month the Fowler Steel Car Wheel Co. has taken orders from about 16 important roads, and among those of the past few days have been orders from the Great Northern for 500 wheels, Chicago, Rock Island & Pacific, 100 and from two other large roads for 200 and 400, respectively. Since the company has commenced to produce its own steel it has greatly improved the quality of the wheels rolled.

The Americus Construction Co., of Americus, Ga., with a paid-up capital of $50,000, was organized during the past week.

A new vestibule train of eight cars on the Delaware, Lackawanna & Western is to be equipped with Gold's auxiliary drum and double coil system of car heating, and with the Johnson Electric Service Co.'s automatic heat regulator.

The American Belt Co., of Lowell, Mass., is busy on railroad work in bolts, nuts, screws and forgings to meet orders coming from the South. The works employ 250 hands and are running full time. Orders from Mexico and some of the South American countries have been recently received.

J. A. Hinson, F. A. Small and J. F. Rehn, of Chicago, have incorporated the Hinson Draw Bar Attachment Co. The company has a capital stock of $250,000.

It is stated that the plant of the Ross-Meehan Brake Shoe Co., of Chattanooga, is to be enlarged for the manufacture of vacuum and compressed brakes for street, cable and electric roads, the patents for which are controlled by Charles Herron, Vice-President of the Ross-Meehan Co.

Iron and Steel.

The Troy Steel & Iron Co., of Troy, N. Y., blew in its No. 2 furnace recently and the entire blast furnace plant, including three stacks, is in operation.

The Leechburg Foundry & Machine Co., of Pittsburgh, has received a contract for the cast iron work for the new blast furnace to be erected by the Thomas Furnace Co., at Niles, O. The furnace will be 75 × 17 ft., and will be ready for blast about Sept. 1 next.

The contract for the buildings for the Anniston Rolling Mill, at Anniston, Ala., has been let to J. Black & Co. There will be 12 puddling and two heating furnaces and two sets of rolls, and the mill will have a capacity of 20 tons daily of merchant, bar and structural iron.

The Berlin Bridge Co., of East Berlin, Conn., has received an order for the iron buildings for the Huanchaca Co., of Bolivia, South America, which will consist of a boiler house, 45x60 ft., an air compressor house, 45x80 ft., and an engine house 42x75 ft. These buildings will be made entirely of iron put together in this country, taken down and shipped to Bolivia, where they will be erected by native workmen.

The Rail Market.

Steel Rails: Eastern mills have sold about 25,000 tons to southern roads. They quote $30.50@$31.50 at mills. At Pittsburgh the quotations are $31@$32 on cars at works, and at Chicago, $35.

Old Rails: The quotations are: At New York, $24@$24.50 for large quantities. At Pittsburgh $25.50@$26 for old iron rails, and at Chicago, $23.50 nominally for iron rails.

The Boyden Brake.

An exhibition of the Boyden Brake Co.'s quick action automatic air brake was given at the company's shops in Baltimore on May 27, before a party of railroad men and others. The apparatus, as arranged for actual service, was set up in the shops, the length of train pipe being 2,244 ft. The steam pressure used was 140 lbs., and with this the storage reservoir was filled to a pressure of 70 lbs. per inch in 68 seconds. The company has enlarged its shop capacity, and now has a 125 h. p. engine. Among the roads from which orders have lately been received are the Baltimore & Ohio; Baltimore & Ohio Southwestern; New York, Susquehanna & Western; Western Maryland; Cincinnati, New Orleans & Texas Pacific; Lake Erie & Western; Brooklyn & Brighton Beach; Duluth & Winnepeg; Raleigh & Gaston; Wilmington, Columbia & Augusta; Seaboard & Roanoke; South Carolina; and Chicago & Eastern Illinois.

Erie Docks at Weehawken.

The New York, Lake Erie & Western will next week let contracts for Piers G and I of the company's new terminal plant at Weehawken. Pier G is to be 40 by 900 ft. with two tracks extending the whole length of it. Pier I is to be 66 by 140 ft., with five tracks. The piers now under contract are C and D, which are respectively 100 by 720 and 100 by 760 ft.

Electric Headlight.

W. L. Silvey's patent electric headlight is now being tried on the Cincinnati, Hamilton & Dayton. It is run by a storage battery, of which 24 cells are placed on the tender. The intensity of the light can be readily varied by the engineer, the maximum being 3,000 candle power.

St. Clair Tunnel.

Good progress still continues on the St. Clair River tunnel. On the Canadian side the men are now at the shaft on the bank of the river, and on the United States side the tunnel is well on to 300 ft. under the river. Good progress was made last week, and nothing better could be asked by the tunnel officials.

Peerless Steam Hose.

The Peerless Rubber Mfg. Co., 34 Murray street, New York City, is now introducing a new brand of hose, made of the "Rainbow compound." The company has made elaborate and extensive experiments, and has produced in the Peerless hose a mineralized rubber compound which will withstand the action of water and steam and of dry heat and cold without disintegrating. It is further claimed that hose made of this compound will resist the action of oils, ammonia and alkalies, and will not harden or crack under the highest degree of steam heat. It is used successfully in place of metal gaskets in joints where other devices have failed to prevent leaking. The hose is now manufactured in all styles, plain, corrugated and steel-clad, the latter being covered with a coil of flat Bessemer steel wire, galvanized. By the use of this steel armor the hose will stand 200 per cent. more pressure. The hose is adapted to both air-brake work and for steam heating, and therefore only one stock need be carried by a road for both these departments. The general sales agent of the company, Mr. Charles H. Dale, will exhibit these goods at the conventions at Old Point Comfort.

Signaling.

The Illinois Central has recently put in service seven of the Pennsylvania Steel Co.'s magneto-electric semaphores. They are said to be working satisfactorily.

A Three-Drum Sand-Papering Machine.

The Egan Co., of Cincinnati, has recently brought out a three-drum sand-papering machine for polishing wood, to meet a large demand for such a machine. The makers claim for it a number of advantages and conveniences not found in other machines.

New Machine Shops.

The Georgia Pacific is to build new machine shops near Birmingham, Ala., which when completed and in full operation will give employment to about 1,200 men. It is understood that the orders for the new machinery will be placed shortly, although the number and size of buildings have not yet been decided, nor has the site for the plant been selected.

The Chesapeake & Ohio has graded a 45 acre tract of land at St. Albans, W. Va. and is preparing to build round houses, shops and elevators.

The Baltimore & Ohio has purchased 63 acres of land in Benwood, four miles east of Wheeling, W. Va., and will locate shops and yards for the Pittsburgh Division of the Trans-Ohio Division and the Fourth Division of the main line east.

Buffalo Disk Wheels with Direct Attached Engine.

The Buffalo Forge Co. (Buffalo, N. Y.) has lately got up a ventilating wheel with a direct-attached engine. These engines are constructed with special reference for the work and occupy but little space, though capable of driving the fan at high speed without noticeable vibration or noise. They occupy little more space than is required for belt connections. The rate of speed may be readily increased or diminished as the work requires and there is perfect control of the fan as to starting or stopping instantly. This engine, which is double reciprocating with square pistons, will work as well turned upside down and bolted to beams overhead or placed with cover end down with shaft in a perpendicular position as in the regular way. The engine is in a casing, in which a rectangular piston is held to move backward and forward horizontally. This piston has a chamber in which an inner piston is mounted to slide vertically, the inner piston being mounted in its centre on a crank pin, projecting through a slot in the back plate of the outer piston, the crank pin being secured to a crank disk on the inner end of the main driving

shaft. The pistons are held steam tight to the face of the cover by two plates inserted in the back of the outer piston, and acting as slides on the back of the case, which is fitted to receive them. These plates are acted upon by steam let in between them and the back of the outer piston. The wear of the outer piston is taken up by plates, on the under side of which are inclines sliding on corresponding inclines in the bottom of the casing, whereby the pressure of the bottom plate upon the piston can be readily adjusted by means of set screws on the outside of the case. The wear of the inner piston is provided for by detachable slides at the ends. Coiled steel wire springs pocketed in the ends of the pistons hold the slides firmly to the planed surface of the inside of the outer piston, in which the inner piston moves up and down. There are only two bearings in the body of the engine, the main journal and crank pin. These are in the form of bushings, and are made of phosphor bronze.

Electric Street Railroad in Ottawa.

The railroad committee of the city of Ottawa has decided to advertise for offers for the construction of the proposed electric street railroad in that city.

Goodwin's Car Platform Gate.

This is the name of a platform gate recently applied to some passenger cars of the New York, Providence & Boston road by J. B. Goodwin, of Providence, R. I. It is a collapsible iron lattice, and does not swing; it therefore can always be readily opened however crowded the platform may be. It is supported on a vertical iron rod fixed upon the buffer beam, and extending directly upward to the car roof, and, therefore, opens away from the car body instead of towards it, as is the case with other gates recently described. A brakeman standing between two cars, with one foot on each, can therefore open the gates of both without moving from his position. When open the gate closes up against the vertical support, and when closed the outer end, which comes next the car body, rests against lugs which prevent it being pushed outward. It is 44 in. high, considerably higher than Smith's or Wood's, and one of the advantages claimed for it is that it affords a more complete barrier against persons who are inclined to climb over it. The automatic lock is claimed to be of such construction that unauthorized persons cannot readily manipulate it, although it is operated quickly and with facility by trainmen.

Wood's Car Platform Gate.

The R. Bliss Mfg. Co., of Pawtucket, R. I., is now introducing this gate for use on the platforms of passenger cars. It is in use on 50 cars of the New York, Providence & Boston road, and has proved strong, simple and satisfactory in service. The general appearance of this gate is somewhat similar to F. Smith's gate which is in use on the Boston & Albany, and was described in the *Railroad Gazette* of March 21 last. It is hung on a swinging bracket and folds back against the end of the car when not in use, the same as those on the Boston & Albany cars, but the regulating bracket which braces the gate in position (when closed) is fastened to the corner of the car instead of to a point near the door. It cannot swing outwards and so avoids all danger from passengers leaning against it. It latches readily, either open or shut, by "simply turning the latch and giving it a swing.",

The Industrial Works of Bay City.

The Industrial Works of Bay City, Mich., has just completed a 35-ton wrecking and construction train and an extension pile driver for the Kansas City, Wyandotte & Northwestern road, and a wrecking crane and car has just been built for the Cincinnati, Saginaw & Mackinaw. A large shipment has recently been made to Greytown, Nicaragua, via New York, filling an extensive order for steam shovel and pile driving machinery, from the Nicaragua Canal Construction Co. A 35-ton crane is under way for the Michigan Central, and among other orders for cranes are powerful traveling, transfer and piller cranes, for the Michigan Central and Des Moines Union roads, the Delaware & Hudson Canal Co. and the Syracuse Steel Foundry Co. The works are just completing steam shovels for the Flint & Pere Marquette and Charleston, Cincinnati & Chicago roads; pile drivers for the Union Pacific and Zanesville & Ohio River roads; and a number of each of these machines are under way for other companies. The firm is also engaged upon extensive orders from the Chicago, Milwaukee & St. Paul; Chicago, Burlington & Quincy; Kentucky Central, and other roads, for rail cutting and drilling machinery, transfer tables, etc. The Industrial Works is making a specialty of cranes, for almost every variety of use, including shop, yard and station service, and wrecking and constructing purposes. The firm proposes to build further additions to the present extensive plant.

LOCOMOTIVE BUILDING.

Four large Baldwin engines have just been received by the Interoceanic Railroad of Mexico.

The Rhode Island Locomotive Works are said to be building three compound locomotives for one of the Brooklyn elevated roads.

The Toledo & Ohio Central has recently ordered five freight locomotives to be delivered in August.

The Denver, Texas & Ft. Worth has recently placed an order for 12 locomotives.

The Columbus, Hocking Valley & Toledo has received three locomotives from the Rhode Island Locomotive Works, each weighing 120,000 lbs.

CAR BUILDING.

The Harrisburg Car Mfg. Co., of Harrisburg, Pa., is building 50 cars for the Eastman Freight Car Heater Co. These cars in addition to the heating apparatus will be equipped with the Zimmerman refrigerating device.

The Texas & Pacific has recently built a number of passenger cars in its shops at Marshall, Tex., from designs by the Master Car Builder. These cars are to be equipped with the Scarritt seat of the Scarritt Furniture Co., of St. Louis, similar to those recently furnished the International & Great Northern.

The Louisville & Nashville is having 18 passenger cars built by the Ohio Falls Car Co., of Jeffersonville, Ind., and the Harlan & Hollingsworth Co., of Wilmington, Del. Some of the cars will be vestibuled. The seats will be made by the Scarritt Furniture Co., of St. Louis.

The South Carolina road will soon order 200 freight cars. The Jackson & Sharp Co. has 11 passenger cars under contract for the road.

The order for 1,000 cars received by the Erie Car Works, referred to last week, was from the New York & New England.

The Jackson & Sharp Co., of Wilmington, Del., has delivered the first lot of an order for 16 passenger cars for the New York, Ontario & Western.

The East Tennessee, Virginia & Georgia has placed an order with the Southern Car Works, of Knoxville, Tenn., for 500 hopper bottom coal cars.

The Missouri Car & Foundry Co., of St. Louis, is delivering 100 freight cars a week to the Cleveland, Cincinnati, Chicago & St. Louis.

The stockholders of the Basic City Car Works Co. will hold a meeting in Basic City, Va., June 24, to complete the organization of the company and to decide upon plans for the proposed buildings. M. A. Booker is Secretary and Treasurer of the company.

The Michigan Central is building at its shops fifty 60,000-lb. freight cars, equipped with automatic couplers and the Westinghouse air brake.

The new shops of the Northern Pacific & Manitoba at Winnipeg will soon be entirely completed. Already several freight cars have been built in the shops. The company has received two passenger cars from the James Crossen Car Works, of Coburg, Ont.

BRIDGE BUILDING.

Austin, Tex.—The Hardemann-Willbarger Bridge Co. has been incorporated to build a bridge across the Red River. The capital stock is $50,000.

Catlettsburg, Ky.—The King Iron Bridge & Manufacturing Co., of Cleveland, O., has been awarded the contract for the construction of an iron bridge over Catlett's Creek, at Catlettsburg.

Chilesburgh, Ky.—Sealed proposals will be received up to June 14 for the construction of an iron bridge across Boone's Creek, about 6 miles from Chilesburgh Station on the Chesapeake & Ohio. The bridge is to have two spans of 30 and 50 ft. respectively and a 12 ft. roadway. A. D. Warnock and J. D. Lyle are the Commissioners. Their address is Box 229, Lexington, Ky.

Dalton, Ga.—J. C. Norton, of Dalton, will receive bids until June 28 for building an iron bridge across Mill Creek.

Grand Rapids, Mich.—It is proposed to erect a bridge across the river at Lyons street, in Grand Rapids.

Itasco County, Minn.—The contract will be let by the County Commissioners on June 21 for building a combination wood and iron bridge across Prairie River.

Jefferson, Tex.—The County Commissioners of Marion County will soon award the contracts for rebuilding a number of bridges.

Lamar's Mill, Ga.—J. A. Daniel, of Forsyth, Ga., will receive bids until June 17 for the construction of a bridge across Towaliga River at Lamar's Mill.

Lancaster, Pa.—The Commissioners of Lancaster and Chester counties will build a bridge over the Octoraro at Little Britain Township.

Logan, Ia.—Two iron bridges will be constructed over the Snake River at this place.

Middletown, N. Y.—The City Engineer has been instructed by the Common Council to prepare specifications for two bridges, to be built in Middletown.

New Orleans, La.—William Golding has been awarded the contract for building an iron and wood pontoon bridge over the new basin canal at Metaire Ridge.

Snohomish, Wash.—The San Francisco Bridge Co. has the contract for building the bridge across the Stillaguamish River. Work on the foundation has been completed and it is expected that the entire bridge will be finished by July 1.

Tonawanda, N. Y.—The bill re-appropriating $20,000, and making a further appropriation of $12,000 for an iron bridge over the Tonawanda Creek and Erie Canal at Tonawanda, has become a law.

Wheeling, W. Va.—The plans for the bridges of the Wheeling Bridge Co. across the Ohio River at Wheeling have been completed by the engineers, Ferris & Kaufman, of Pittsburgh. The total length of the structure will be 1,989 ft. Beginning at Main street in the city, there will be a fill of 166 ft. to the first pier. From the abutment to the first channel pier is 225 ft. The channel span is 525 ft., and the third span to the Island shore pier is 295 ft. The bridge beginning at that point passes over a steel viaduct supported on steel piers to South Penn street, 778 ft., with a four per cent. grade. The height of the channel span is 90 ft. above low water mark. The Bock River steel bridge will consist of three equal spans. An electrical street railroad will cross the bridges. The piers will be built by Jolly Bros., of Pittsburgh, of surface boulder stone, from Harrison County, O.

Williamsburg, Ky.—A bill has been introduced in the state legislature to incorporate the Williamsburg Bridge Co.

Williamstown, Ky.—The King Iron Bridge Co., of Cleveland, O., has been given the contract to build a bridge at Williamstown, at a cost of $12,000.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, quarterly, 2 per cent., payable June 30.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on the preferred stock, semi-annual, 1½ per cent., and extra, 1 per cent. on the common stock, payable July 1.

Milford, Franklin & Providence, semi-annual, 2 per cent.

Old Colony, 3½ per cent., payable June 1.

Philadelphia, Wilmington & Baltimore, 3 per cent., payable June 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago, Kansas & Nebraska, annual, Topeka, Kan., June 11.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 7.

Cincinnati, Hamilton & Dayton, annual, 200 Fourth street, Cincinnati, Ohio, June 17.

Fort Worth & Denver Terminal, special, Board of Trade Building, Fort Worth, Tex., June 9.

Indianapolis & Northeastern, special, Indianapolis, Ind., June 27.

Memphis & Charleston, special, Memphis, Tenn., July 9.

Missouri Pacific, special, St. Louis, Mo., July 15.

Milwaukee, Lake Shore & Western, annual, Milwaukee, Wis., June 11.

Nashville, Chatanooga & St. Louis, special, Nashville, Tenn., June 25.

Ottawa, Arnprior & Renfrew, special, Ottawa, Ont., June 10.

Philadelphia, Newtown & New York, special, Norristown, Pa., June 10.

Shamokin, Sunbury & Lewisburg, special, Philadelphia, Pa., June 25.

St. Joseph & Grand Island, annual, Elwood, Kan., June 10.

St. Louis & San Francisco, special, St. Louis, July 21, to vote on the proposition of an increase of the common stock of the company.

St. Paul & Sioux City, annual, St. Paul, Minn., June 7.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va., June 10. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The *American Railway Master Mechanics' Association* will hold its next annual convention at Old Point Comfort, Va., beginning June 17.

The *International Association of Car Accountants* will hold its fifteenth annual convention at the Hotel Brunswick, New York City, June 24, 25 and 26.

The *Association of American Railway Accounting Officers* will hold its next annual meeting at the Stockton Hotel, Cape May, N. J., July 9.

The *National Association of General Baggage Agents* will hold its next annual convention at Chicago, Ill., July 16.

The *Traveling Passenger Agents' Association* will hold its next annual convention at Buffalo, N. Y., August 19.

The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m. The Club has adjourned until Tuesday, Sept. 16.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York. The annual convention will be held at Cresson, Pa., June 26.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.

The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Meeting of the Iron and Steel Institute of Great Britain.

At the invitation of the American Institute of Mining Engineers, cordially supported by the American Iron and Steel Association, the American Society of Civil Engineers, the American Society of Mechanical Engineers and the United States Association of Charcoal Iron Workers, the Iron and Steel Institute of Great Britain has decided to hold its fall meeting in the United States. An invitation has also been extended to the Verein Deutscher Eisenhüttenleute. Many members of both the English and the German societies have already accepted the invitation. Lists of these acceptances have been published. The American reception committee has been organized with Andrew Carnegie, Chairman; George A. Crocker, Treasurer; C. Kirchhoff, Jr., Secretary. The Central Committee and the General Committee have also been organized, and among the names of the committeemen appear those of many citizens prominent in engineering and mining industries. It is expected that the foreign guests will ar-

rive towards the close of September, and many of them will attend the meeting of the American Institute of Mining Engineers in New York, Sept. 29 and 30. During the stay in New York the statue of Alexander L. Holley will be unveiled. The visitors will then travel through the country. The programme includes the meeting of the American Institute of Mining Engineers, Sept. 29 and 30, the meeting of the Iron and Steel Institute in New York to Oct. 3, and then a journey to Philadelphia, Johnstown, Altoona, Pittsburgh and Chicago, the party to arrive at Chicago Oct. 14. At Pittsburgh two international sessions will be held. At Chicago the party will divide into two groups, one going to Lake Superior and the other to various southern points. The northern trip will embrace the principal points of interest in and about the Lake Superior country and a visit to Niagara Falls returning, the party to arrive at New York Oct. 25. The southern trip will embrace visits to Alabama, Tennessee, Virginia and Washington, and will terminate at New York Oct. 27.

American Society of Civil Engineers—Annual Convention of 1890.

The convention will be held at Cresson, Pa., beginning Thursday morning, June 26. The rate at the hotel for this occasion has been reduced to $3 per day. The Trunk Line Association, the Southern Passenger Association, and the Central Traffic Association (except in Michigan) have given, for persons attending this convention, a rate of one and one-third full fare, certificate plan. It is hoped that similar arrangements as to rates will be made by the New England Passenger Committee and Western States Passenger Association. Special information in greater detail as to this certificate plan will be sent those who express their intention of attending the convention. It has been arranged to secure a special train to leave New York, foot of Cortlandt or Desbrosses streets, on Wednesday morning, June 25, at 10 a. m., and to run as a second section of the Chicago Limited, arriving at Cresson in the afternoon. This train will be made up of chartered cars and the cost to each person will be about that of the ordinary Pullman accommodation.

The President of the Society, Mr. William P. Shinn will deliver the Annual Address, and the following new papers will be presented at the Convention:

On a Method of Taking Cross-Sections of Deep Rock Cuts, by Triangulation, F. W. Watkins.

On the Littoral Movements of Inlets along the coast of New Jersey, Lewis M. Haupt.

The Designing and Erection of the Oakley Arch, J. Foster Crowwell.

The Stability of Loaded Masonry Arches, A. S. C. Wurtele.

Irrigation in India, Herbert M. Wilson.

Construction and Maintenance of Track, Julien A. Hall.

Street Electric Railways, O. H. Landreth.

The Ventilation of Tunnels, N. W. Eayrs.

Inland Sewage Disposal with special reference to the East Orange (N. J.) Works, Carrol Ph. Bassett.

It is expected that reports will be presented by the special committees on revision of the constitution, on uniform standard time, on the compressive strength of cements and the compression of mortars and settlement masonry, on uniform methods of testing materials used in metallic structures, on standard rail sections, and these subjects discussed. A meeting of the committee on standard rail sections will be held at the hotel headquarters on the evening of June 25. A full attendance is requested.

Boston Society of Civil Engineers:

The regular meeting of the Boston Society of Civil Engineers was held at the American House, Hanover street, Boston, Wednesday, May 21, 1890, at 8 o'clock.

President Clemens Herschel in the chair, forty-six members and fifteen visitors present.

George F. Chace, of Taunton; Professors Thomas M. Drown and William T. Sedgwick, of the Massachusetts Institute of Technology, were elected to membership.

The following report on affiliation with the American Society of Civil Engineers was presented and the committee was authorized to forward the appended letter to the American Society's committee:

From Mr. Wm. P. Shinn, the chairman of the American Society of Civil Engineers' Committee on Revision of Constitution and By-Laws, a circular letter, dated March 26, has been received, which requests the Boston Society's Committee of Conference to present in writing any suggestions for the establishment of close relations between the societies, and states that the American Society of Civil Engineers' Committee is to meet June 4, at New York, where it will be pleased to receive the Boston Society of Civil Engineers' Committee. Accompanying the letter are various typical propositions which have been received by the American Society of Civil Engineers' Committee, and are designated as "A," "B," "C," "D" and "E." "E" is a carefully drawn statement of the difficulties in the way of a union of societies; the other four are plans for the establishment, by the American Society of Civil Engineers of local branches which are forbidden to act in the name of the American Society of Civil Engineers. "A," "B," and "C" require branch organizations to be consistent with the American Society of Civil Engineers Constitution; and "A" and "B" expressly forbid branches to act officially on public questions without the previous approval of the American Society of Civil Engineers. "A" and "B" allow branches to elect to membership of a subordinate grade in the American Society of Civil Engineers, but "B" makes approval by the American Society of Civil Engineers a requisite; "C" limits membership to the various grades of members of the American Society of Civil Engineers. By "A," all property is to be held in the name of the American Society of Civil Engineers, but may be in trust for a branch; and it is suggested that any existing local society wishing to become a branch be first dissolved; by "B" and "C," property may be held in the name of the branch; and by "B" an existing local society may become a branch in the same manner as a new organization. A draft of a letter which we have prepared to send as a reply to Mr. Shinn, Chairman of American Society of Civil Engineers' Committee, is attached hereto, and forms a part of this report.

Committee. { FRED. BROOKS, DWIGHT PORTER, SIDNEY SMITH.

Draft of proposed letter to Wm. P. Shinn, Esq., Chairman, etc: . . . We may add, in reference to the plans which you are so good as to send us, that plan "D" is the one that seems to us best adapted to meet the views of the Boston Society of Civil Engineers. The leading objects which we hope to attain by the establishment of relations between societies are, to afford opportunities for the members of different societies to discuss each others' papers and projects, attend each others' meetings and excursions, and have access to each others' rooms and libraries, with equitable adjustment, of course, of expenses. Plan "D" explicitly states its purpose to be to promote the presentation and discussion of papers, and, by consequence, social and professional intercourse. If the American Society of Civil Engineers and the local societies with which the Boston Society of Civil Engineers is now associated in the Association of Engineering Societies shall unite in favoring plan "D," with, perhaps, some little modification of its details, we have no doubt that the Boston Society of Civil Engineers will gladly cast in its lot with the rest. That is to say, we think the American Society of Civil Engineers might decide that the Boston Society of Civil Engineers, with its own name, charter, constitution, by-laws, library, money in treasury, etc., was acceptable as a branch, and was to be included in the system of exchanges provided for in plan "D," so long as the two societies should see fit mutually to continue the relation.

We notice that plans "A," "B" and "C" provide somewhat similarly to plan "D" for the transmission of papers and discussions, but go further, and add various provisions for organic connection to be made by changes of constitution of the societies. After the exchange of papers contemplated by plan "D" shall have led to better acquaintance, and have augmented the feeling of relationship between the members of the American Society of Civil Engineers and the Boston Society of Civil Engineers, perhaps some organic union will naturally be effected. Whether such organic relations should now be entered into between the American Society of Civil Engineers and other socities, while the Boston Society of Civil Engineers remains connected only by plan "D," or some equivalent, we do not feel called upon to discuss. . . .

PLAN D.

I. Branches of the American Society of Civil Engineers may be authorized by the Board of Direction at points where, in its judgment, the membership is sufficiently large to warrant a local organization.

II. The sole object of authorizing the establishment of such branches, so far as the American Society of Civil Engineers is concerned or involved, is to encourage and facilitate the presentation and discussion of papers, with the consequent promotion of social and professional intercourse among neighboring members and others enjoying a community of interests with them.

III. Branches may make their own rules and regulations regarding organization, membership and proceedings, but the name of the society shall be used only as authorized by its constitution and by-laws. Membership in a branch does not of itself constitute membership of any class in the American Society of Civil Engineers

IV. Advance copies of papers presented to the society shall be sent to each branch for discussion, and each branch shall send an advance copy of every paper presented to or read before it to the secretary of the society for presentation to the society, and for distribution to other branches. Copies of all discussions shall also be forwarded to the secretary. Such papers and discussions shall be considered as though had before the society.

V. Branches shall be supplied with any number of copies of papers and their discussion, upon the same conditions as they are now furnished to members of the society. Should any branch desire to be supplied with complete copies of the transactions, the Board of Direction is authorized to fix an equitable rate of subscription for the same.

VI. An existing local engineering society may become a branch of the American Society of Civil Engineers, provided it come within the conditions of Section I of this article.

VII. The Board of Direction is authorized to formulate from time to time the necessary rules for carrying into effect the provisions of this article.

VIII. The Board of Direction may at any time by a two-thirds vote of all its members dissolve any branch, so far as its relations with the society are concerned. No such vote, however, shall be valid unless it include a majority vote of all the non-resident members of the Board.

Mr. S. L. Minot read a paper entitled "Improved Railroad Terminal Facilities for Providence." The paper gave quite fully the history of the railroads entering that city, and the various plans which have been submitted for improving the station accommodations. The plan which has at last been adopted, devised by Mr. Minot and Mr. E. P. Dawley, of the N. Y., P. & B. R. R., was fully explained, and its superiority over any of the former plans made very apparent.

Mr. L. B. Bidwell also read a paper describing the improvement at Asylum street crossing in Hartford, Conn., and the new station in that city.

Engineers' Club of Kansas City.

A regular meeting was held in the Club Room at 8 p. m., May 12, F. E. Sickels in the chair, K. Allen, Secretary. There were present 11 members.

Mr. A. J. Mason read, for the Committee on Affiliation of Engineering Societies, abstracts from a communication from Prof. J. B. Johnson, of St. Louis, proposing a federation of the leading engineering societies. Mr. Mason also presented a brief verbal report for the Committee on Affiliation, the sentiment of which was adverse to a connection of the local societies with the American Society. Mr. Allen thought the field of work of the local societies was quite distinct from that of the American Society, and that joint publications would be unnecessarily expensive and cumbersome for many members. Messrs. Filley and Stone were opposed to the proposed "Federation" having a local habitation, while Messrs. Sickels and Mason held the opposite view, and thought that by selecting the city of Washington especial advantages would be attained without incurring hostility. Mr. A. Clifford Thomson was elected as member.

The Secretary read for the author, Robert M. Sheridan, a paper on "The Evolution of the Elevator."

Beginning with the year 1855 the paper traced the growth of the elevator engine from the oscillating cylinder reversing engines (which marked the first step in the development of this branch of engineering), to the perfected steam worm-geared passenger elevator engine in use at the present time. A summary of the various steps embracing the changes in engines of this class was presented. The vertical cylinder hydraulic machine was described and contrasted with the perfected horizontal cylinder elevator and its improvements. The workings and advantages of the lever operating device in its connection with the auxiliary valve, together with the pronounced usefulness of the independent automatic stop valve, were explained. The description of the principle of the centrifugal governor attached to the car as a safety device for arresting the car's motion was given and accompanied by a general statement concerning the present requisites for elevator service, covering the point of absolute regulation at the highest speeds by the use of the improvements mentioned. The travel of the tower elevator in the Chicago Auditorium building, passing through a distance of 220 ft. at a speed of about seven miles per hour, or 600 ft. per minute, was cited as a case in point covering the various demands upon elevator service at the present time. The future of the work, judging by the past, insures the elevator's evolution along the lines now set, keeping pace with the demand for buildings that tower nearer the sky year by year.

PERSONAL.

—Mr. Henry Swindell, of the Swindell & Smythe Co., engineers and contractors of Pittsburgh, Pa., died at his residence in Allegheny, Pa., May 23, aged 52 years.

—Mr. George Westinghouse, Jr., was elected Vice-President of the Consolidated Car Heating Co., at the annual meeting in Albany, N. Y., last week.

—Mr. William G. Neilson, who has been Manager of the Standard Steel Works, of Logan, Pa., for over 13 years, has been elected Vice-President of the Chester Rolling Mills, of Thurlow, Pa.

—Mr. M. D. W. Loomis, for some years Treasurer of the Linden Steel Co., Lim., of Pittsburgh, has resigned, having accepted a similar position with the Detroit Steel & Spring Works, of Detroit, Mich.

—Mr. S. H. Harrington, Mechanical Engineer of the New York, Lake Erie & Western, with headquarters at Susquehanna, has resigned, and Mr. A. E. Mitchell, Engineer of Tests, has been appointed to succeed him

—Mr. Sandford Fleming has just been elected an honorary fellow of Royal Geographical Society of Vienna, as a recognition of his valuable writings and researches in connection with the 24 hour system of time notation.

—Mr. Daniel N. Zimmerman, Secretary of the Camden & Atlantic and its leased lines, has resigned after a continuous service of 18 years. Mr. Zimmerman intends to leave for Europe this week and will spend several months abroad.

—Mr. S. F. Judy, Superintendent of the Rio Grande Division of the Texas & Pacific, has resigned his position with that company, with which he has been connected since the construction of the road, to become General Manager of the Pecos Valley Line, now under construction.

—A number of the Grand Trunk employés at Richmond, Ont., last week, presented an address and a purse to Mr. Robert Hay, who, on account of ill health, has been obliged to resign his position as Superintendent of the Eastern and Champlain districts of the Grand Trunk.

—Mr. John N. Abbott, late Chairman of the Western States Passenger Association and previously also Commissioner of the Southwestern Passenger Association, and General Passenger Agent of the New York, Lake Erie & Western for 14 years, has been appointed Assistant to the President of the Great Northern Line.

—Mr. E. P. Vining, Assistant General Manager of the St. Louis & San Francisco, in charge of the traffic department, has resigned that position, to which he was appointed in March. Mr. Vining was formerly General Traffic Manager of the New York & New England, and before that was for a long time on the Union Pacific.

—Mr. John J. Sproull, General Agent in New York City of the Freight and Passenger Department of the Illinois Central, died at his home, this week, in New York, aged 71 years. Mr. Sproull was appointed General Agent at New York in 1856 and he has held the position continuously since.

—Maj. J. C. Paul, late General Manager of the Woodruff Sleeping Car Co., and Superintendent of Equipment of Pullman Car Co., has been appointed Vice-President of the American Steel Car Wheel Car Co., of Boston, and will have general charge of the sales department, with his office at 115 Broadway, New York City.

—Mr. Frederick N. Finney, formerly General Manager of the Wisconsin Central and later Managing Director of that road, has been elected President of the Minneapolis, St. Paul & Sault Ste. Marie, to succeed Mr. Thomas Lowry, who resigns to devote his attention to the numerous street railroads in which he is interested.

—Mr. W. B. Hamblin, General Freight Agent of the Chicago, Burlington & Northern has been appointed Assistant General Freight Agent of the Chicago, Burlington & Quincy. It is understood that Mr. Hamblin will retain his present position, to which he was appointed in June, 1886. He was formerly General Agent of the Atchison, Topeka & Santa Fe, at Denver, Col.

—Mr. Albert J. Earling, who succeeded the late Mr. J. T. Clarke as General Superintendent of the Chicago, Milwaukee & St. Paul, has been appointed General Manager of the road. Mr. W. G. Collins, Assistant General Superintendent in charge of the Northern District, has been appointed General Superintendent. Mr. Earling has been in the service for 23 years, first as telegraph operator, and as Train Dispatcher, Assistant Superintendent, Division Superintendent, Assistant General Superintendent and General Superintendent.

—Mr. Edward P. Wilson, General Passenger Agent of the Chicago & Northwestern since Oct. 1, 1886, has resigned, and will devote his attention to the Evanston Electric Light Co., of which he is President. Mr. Wilson has been in the railroad service since 1863, and has held some important positions in the traffic department of various roads. He has been General Freight and Passenger Agent of the Cairo & Vincennes; General Passenger and Freight Agent of the Cincinnati Southern, and Commissioner of the Southwestern and other passenger associations. Mr. William A. Thrall, who has been General Ticket Agent of the road since 1873, has been appointed General Passenger Agent to succeed Mr. Wilson, the two departments having been consolidated.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—W. K. Gillette, formerly Auditor of Disbursements, has been made Assistant General Auditor, with office at Topeka, Kan.

Atlantic & Pacific.—The new Board of Directors have elected the following Executive Committee: George C. Magoun, Allen Manvel, Cecil Baring, William Libbey and J. J. McCook. The following officers have been chosen: George C. Magoun, Chairman of the Board; Allen Manvel, President, J. W. Reinhart, First Vice-President and General Auditor; A. A. Robinson, Second Vice-President; J. J. McCook, General Counsel; George R. Peck, General Solicitor; J. A. Williamson, Land Commissioner; H. W. Gardiner, Secretary and Treasurer; F. E. Hancock, Auditor; D. B. Robinson, General Manager, Western Division, and H. L. Morrill, General Manager, Central Division.

Austin & Travis County Rapid Transit.—The officers of this company, which will build a short road at Austin, Tex., are as follows.: M. M. Shipe, of Kansas City, President; J. K. Wrie, of Kansas City, Secretary; C. H. Liebold, of Kansas City, Treasurer. Directors: W. B. Clark and Victor Buck, of Kansas City, and Joseph Nolle and J. T. Breckenridge, of Austin.

Beebe, Des Arc & Brinkley.—The following is the first board of directors of this Arkansas Company: F. P. Lewis, P. K. Roots, J. C. England, A. M. Burton and T. S. Newton, of Little Rock.

Canada Southern.—The annual general meeting of the company for the election of directors was held at the offices in St. Thomas, Ont., June 4. The following were

elected Directors: Cornelius Vanderbilt, William K. Vanderbilt, James Tillinghast, Anthony G. Dulman, Charles F. Cox, Samuel F. Barger, Sidney Dillon, Joseph E. Brown and Edward A. Wicks.

Chicago & Eastern Illinois.—The annual meeting of the stockholders was held in Chicago June 4. R. M. Hoe, J. G. English, D. J. Mackey and C. W. Hilliard were elected directors for a term of three years each. A. R. Flower was elected for one year, to succeed R. P. Flower, resigned, and George W. Saul for one year to fill the vacancy caused by the resignation of H. R. Bishop. At a subsequent meeting of the Board, George W. Saul, the present General Manager, was elected President of the company, to succeed D. J. Mackey. The latter retires from the Presidency, and also from the Executive Committee. H. H. Porter was re-elected chairman of the Board of Directors.

Chicago & Northwestern.—E. P. Wilson having resigned the position of General Passenger Agent, the General Passenger and Ticket Departments of this company have been consolidated, and W. A. Thrall has been appointed General Passenger and Ticket Agent. The following appointments have been made: J. S. Barrow, Assistant General Passenger and Ticket Agent, and W. B. Kniskern, Assistant General Passenger and Ticket Agent.

Chicago, Rock Island & Pacific.—At the annual meeting of the stockholders of the road in Chicago, June 4, these directors were elected: H. H. Porter, Marshall Field, John De Koven; of Chicago, and David Dows, Jr., of New York. The latter succeeds James R. Cowing, of New York. Alexander E. Orr, of New York, was elected to serve out the unexpired term of David Dows, deceased. The Board of Directors elected as officers: President, R. H. Cable, of Chicago; First Vice-President, Benjamin Brewster, of New York; Second Vice-President, Treasurer and Secretary, W. G. Purdy, of Chicago; Third Vice-President, H. A. Parker, of Chicago.

Corpus Christi & South America.—The officers of this Texas company are: E. H. Ropes, of Corpus Christi, Tex.; Vice-President and General Manager is S. H. Mallory, of the Fitzgerald & Mallory Construction Co. of St. Louis, Omaha and Chariton, Ia. Treasurer, N. Gussett, and Secretary is G. W. Westervelt, of Corpus Christi.

Delaware & New England.—At the first annual meeting of the company, held in Wilmington, Del., this week, the following Board of Directors was elected: Henry C. Gibson, S. A. Caldwell, John W. Brock, W. W. Gibbs, Charlemagne Fower, Jr., Francis W. Kennedy, Arthur E. Newbold, Joseph F. Sinnott and Charles F. Berwind, of Philadelphia; John S. Wilson, of New York; Henry O. Seixas, of New Orleans; Henry McCormick, of Harrisburg. Pa., and Arthur Brock, of Lebanon, Pa. John W. Brock was elected President and Arthur E. Newbold Secretary and Treasurer.

Hamilton & Corydon.—The directors of this road are: S. S. Bullis and M. W. Barse, Olean, N. Y.; John Byrne and F. S. Smith, New York City; George L. Roberts, Robert L. Edgett, C. D. Williams and F. E. Brooks, Bradford, Pa. The principal office of the company will be at Bradford, McKean County, Pa.

Indiana Northern.—The following have been elected directors of this company: Wm. K. Vanderbilt, of New York; John Newell and John DeKoven, of Chicago; Geo. C. Greene, of Buffalo, N. Y.; Phineas P. Wright, of Cleveland, O., and John H. Baker and Thomas H. Daily, of Goshen, Ind. The names and addresses of the officers are as follows: John H. Baker, Goshen, President; Cyrus P. Le Land, of Cleveland, Secretary and Treasurer; Francis E Baker, of Goshen, Assistant Secretary, and Geo. H. Kimball, of Cleveland, Chief Engineer.

Joplin Belt.—The directors have elected the following officers: S. C. Henderson, President: O. H. Picher, First Vice-President; D. C. McConey, Second Vice-President, and W. B. McIntire, Secretary.

Missouri, Kansas & Texas.—The Directors have elected H. K. Enos, of New York, President; H. C. Cross, one of the receivers, First Vice-President; Joel F. Freeman, Second Vice-President, and J. Waldo, Traffic Manager, Third Vice-President. The Treasurer is J. De Neuville, and the Secretary is H. B. Henson.

Montreal & Ottawa.—The annual meeting of the directors of this company, formerly the Vaudreuil & Prescott, was held in Montreal last week, and the old board of directors was re elected. J. B. A. Mongenais, of Rigaud, Que., was elected President, and A. Hagar, of Plantagenet, Vice-President.

Newport News & Mississippi Valley Co.—J. L. Hawkins has been appointed Master of Transportation of the Eastern Division of the road, with headquarters at Lexington, Ky., vice A. Lavesque resigned.

New York, Lake Erie & Western.—John W. Fawcett has been appointed Acting Division Roadmaster of the Mahoning Division, vice Charles H. Paine, resigned.

Northern Indiana of St. Joseph County.—The incorporators are: William Miler, J. W. Vanderbosch, William McIron, John F. Clark, and William G. George.

Oregon Improvement Co.—Col. Oliver F. Briggs has resigned the agency of the Union Pacific in Seattle and has been appointed Traffic Manager of the railroads operated by this company, namely, the Columbia & Puget Sound, the Seattle & Northern, from Anacortes to Hamilton, and the Port Townsend & Southern, from Port Townsend to Tenino.

Pecos Valley.—A meeting of the stockholders and directors of the company was held recently, when the following officers were elected: J. J. Hagerman, President; C. B. Eddy, Vice-President; H. C. Lowe, Secretary and Treasurer; S. F. Judy, General Manager, and H. H. Cloud, Chief Engineer. The directors are: Sidney Dillon, New York; J. J. Hagerman, H. C. Lowe, W. A. Otis, Colorado Springs; C. B. Eddy, W. A. Hawkins, and C. C. Bloodgett, Eddy, N. M.

Pueblo & Duluth.—The incorporators are: William A. Winant, William H. Caputt, Ralph A. Weill and R. W. Carman, of New York; J. M. Colemar, C. A. Williams, Thomas Marwood, G. E. Miller, D. Hitchcock, of Nebraska, and Peter J. Minnahan, M. A. Dunn and John J. Stillson.

Port Deposit.—The directors of the reorganized company are: W. Hassell Wilson, President; Jacob Tome, W. J. Thomas L. Marshal Haines and W. C. Cully, of Maryland, and W. H. Barnes and John Hampton Barnes, of Pennsylvania.

St. Louis, Alton & Terre Haute.—At the annual meeting in St. Louis, June 2, the following directors were elected: George F. Peabody, William Bayard Cutting, R. F. Cutting, William A. Read and Schuyler L. Parsons. The directors elected the following officers: George W. Parker, President, General Manager and Treasurer; C. F. Parker, Assistant to the President; E. F. Leonard, Secretary; H. T. Nash, Auditor.

Sedalia, Warsaw & Southern.—The stockholders elected the following directors at a meeting held at Sedalia, Mo., June 2: Jay Gould, George J. Gould, D. S. H. Smith, C. G. Warner, C. S. Greeley, D. M. Edgerton and George C. Smith.

Statesville Air Line.—The following directors were elected at a recent meeting at Statesville, N. C.: Dr. J. J. Mott, David Wallace. S. A. Sharpe, C. L. Summers, Wilfred Turner, P. C. Carlton, R. R. Gwyn, W. A. Eliason, and T. N. Cooper. The directors elected these officers: President, Dr. J. J. Mott; Secretary and Treasurer, C. A. Carlton, and Chief Engineer, W. A. Eliason.

Troy & New England.—The officers of this company are: Walter P. Warren, President; William A. Thompson, Vice-President, and J. J. Tillinghast, Secretary and Treasurer, all of Troy, N. Y.

United New Jersey Railroad & Canal Companies.—At the recent annual meeting in Trenton, N. J., May 28, the following directors were elected, 93,372 shares being voted: William Waldorf Astor, John C. Barron, Joseph D. Bedle, Alfred L. Denniss, Anthony J. Drexel, Charles E. Green, F. Wolcott Jackson, Thomas McKean, Thomas Oakes, Robert C. F. Stockton, Alfred Van Santvoord and John Lowber Welsh.

RAILROAD CONSTRUCTION.
Incorporations, Surveys, Etc.

Abbeville & Northwestern.—This company has been organized in Georgia to build a road from Abbeville, Wilcox County, Ga., to a point on the Georgia Southern & Florida, in Dooly County, a distance of 45 miles. The road will pass through the counties of Wilcox, Pulaski and Dooly.

Akron & Chicago Junction.—Ryan & McDonald, of Baltimore, Md., have the contract for building this road between Akron and Chicago Junction, O., a distance of about 60 miles. Work is now in progress on the section from Chicago Junction east to Lodi, about 40 miles, and tracklaying is to be completed by January 1. The section between Lodi and Akron has not yet been finally located.

Albany & Astoria.—Chief Engineer W. B. Barr is making a survey from Albany northwest to Tillamook, a distance of about 70 miles. As soon as the present engineer corps reaches the mountains two other surveying parties will be put in the field.

Albemarle & Pantego.—This road has now been completed to its southern terminus at Pamlico, N. C., and a branch has been built from the latter point to Bell Haven, a distance of 4½ miles. A branch is now being constructed from a point south of Plymouth, the northern terminus, east towards Creswell, a distance of 5½ miles.

Altoona & Wapsononock.—This road referred to two weeks ago was chartered in Pennsylvania this week. It is to extend from Lexington avenue and 10th street in Altoona, to a point on the Cresson & Clearfield road in Cambria Co., Pa. Two branches are to be built, one from Miller's Blacksmith on the main line of the road to the Pennsylvania machine shops at Junita, one mile long; the other from the main line to Blair Furnace, Blair Co., a distance of one mile. The road including branches, will be 12½ miles long. The capital stock is $75,000. F. G. Patterson, Altoona, is President.

American Midland.—The road was sold at Findlay, O., June 2, at the United States Commissioner's sale, to W. C. Dorin, of New York City, for Patterson & Rosser. The price was $101,000. It is stated that the purchasers bought the road in the interest of the Pittsburg, Akron & Chicago, and that they intend to complete the line to Fort Wayne, Ind.

Asheville & Bristol.—The surveys for this road have been completed for about half the distance, from Asheville, N. C., north to Bristol, Tenn., a distance of 55 miles. At Bristol connection will be made with the Bristol, Elizabethton & North Carolina road, on which construction is now in progress with a force numbering about 300 men. The latter line is 48 miles long, all in Tennessee. There will be three bridges on the Asheville & Bristol, 100 ft., 85 ft., and 210 ft. long respectively. There will be two tunnels, one of which will be 380 ft. long and the other 600 ft. The grades and curves are light. As already noted, the contract for grading has been let to James Raymond, 52 Wall street, New York City.

Baltimore & Ohio.—Engineers are now making a survey between Martinsburg and North Mountain, W. Va., on the main line, a distance of seven miles, for a relocation of the line between these points, to avoid the present steep grade and sharp curves.

Beebe, Des Arc & Brinkley.—This company filed its articles of incorporation in Arkansas last week. It proposes to build a line from Beebe, in White County, via Des Arc in Prairie, to Brinkley, in Monroe County. The distance will be 50 miles. The capital is $200,000. F. P. Lewis, of Little Rock, is a director.

Boston & Maine.—The officers have recently examined the route of a proposed branch from York Beach north to Oganquit, and thence to Wells Beach, Me., on the Western Division; but they declined to state whether any conclusion had been reached regarding the building of the line.

Burlington & Missouri River.—The extension of this road to Deadwood, S. D., is being built under the title of the Grand Island & Wyoming Central, "Deadwood Line." It branches off from the main line of the Grand Island & Wyoming Central, which was completed to Newcastle, Wyo., last year, at a point on the Cheyenne River, Fall River County, S. D., 25 miles north of the Nebraska state line, and extends north via Custer and Hill City, in the Black Hills, to Deadwood. The line is not yet fully located but will be, approximately, 107 miles long. John Fitzgerald & Bro., Lincoln, Neb., are the contractors. The entire line is covered with grading outfits, sufficient force to complete the line within the time of contract, Nov. 1. The grading was commenced about April 15, and is now about one-tenth completed. The line will be laid with 66 lbs. rails, and six miles of track have been laid, tracklaying having been commenced at the Cheyenne River May 10. The work is very heavy and difficult, the maximum grades being 158 ft. per mile, and the maximum curves 12 degrees. The entire line has very many heavy grades and sharp curves. There will be three tunnels on the line, each about 200 ft. long. Sheep Cañon, in Fall River county, is crossed with a wooden trestle 128 ft. high and 600 ft. long, and having 30 spans of 20 ft. each.

Camden County.—J. Alfred Bodine, N. J., has the contract for grading the extension of the road from Mt. Ephriam to Spring Mills, N. J., 8 miles. The section between Mt. Ephriam and Little Timber Creek has been completed.

Canadian Pacific.—The bridge over the Souris River, on the Souris branch, is being erected, and the tracklaying has been completed to the river from Souris, Man. The tracklaying will probably soon be resumed on the section graded last year along the Souris River for 65 miles toward Melita. Nearly all the grading has been completed on the extension from Mission, B. C., south to the international boundary, a distance of 27 miles, and a large part of the tracklaying has been done, but it is not expected that the line will be opened for traffic before September 1, as the bridge over the Fraser River and other matters will delay the final completion of the line.

Canon City, Salida & Pacific.—This company was incorporated in Colorado last week to build a line from Canon City westerly to Salida and to other points in western Colorado.

Cerdan Valley.—This short Mexican road has been completed from the city of Mexico to San Angel, and will soon be placed in operation between these points—probably by June 15. The road has been ballasted, and the only work remaining to be done is the erection of several short bridges. The line extends from the City of Mexico, through Tacubaya, Mixcoac and San Angel.

Chicago, Ft. Madison & Des Moines.—The survey is now progressing for an extension from Birmingham west through Eldon and South Ottumwa, to Albia, Ia., a distance of about 45 miles. The grades will be light, and there will be few bridges. The largest will probably be at Eldon. The right of way is now being secured, and the company will soon submit a proposition to Ottumwa, asking the town to vote a subsidy for the extension.

Chicago, Milwaukee & St. Paul.—Surveys have been recently made for a branch from Shullsburg, Wis., west to Farley, Ia., a distance of about 45 miles.

Corpus Christi & South America.—The town of Rio Grande, Tex., has completed a subscription of $30,000 to secure the building of this road to that place. A similar subsidy has also been voted by the town of Hidalgo, on the Rio Grande River, near Brownsville.

Coudersport & Port Allegheny.—W. S. Gratten, of Buffalo, N. Y., has been awarded the contract for grading the section of the Coudersport and Pine Creek road, which is an extension of this line, between Coudersport, Pa., and Sweden Valley, a distance of five miles. The grading has been begun with a force of 400 men and 30 teams. The line is to be continued to Galeton and Ansonia, 33 miles. T. J. Rogers, of Buffalo, is Chief Engineer.

Coupville, Admiralty Bay & Chicago.—Articles of incorporation have been filed in Washington to construct a road from Coupville to the beach at Admiralty Bay, and such branches as may be decided upon. The capital stock is $50,000. The trustees are: J. M. Babcock, H. B. Lovejoy, Sabine Abbott, J. W. Calhoun, C. P. Ferry, C. O. Morgan and B. W. DeCourcey.

Dallas & Oak Cliff.—This company is now completing a belt line at Dallas, Tex., which will be about 10 miles long. The road is built for suburban business to the hills on the west side of the river at Dallas, through Oak Cliff, a residence town. There are two miles of trestling and two steel and iron bridges across the Trinity River which were built at a cost of $20,000 each. The line is built through some heavy rock cuts, and is ballasted with stone and gravel throughout. It is laid with 56 lb. rails, and has a maximum grade of about one and three-fourths per cent. and no sharp curves. It is operated like the New York Elevated railroads, with stations every 1,000 ft. The road carried 3,000,000 people last year and the officers expect that it will probably carry 5,000,000 passengers this year. The capital stock is $400,000, and is nearly all owned by T. L. Marsalis, of Dallas, the President of the company.

Delaware, Lackawanna & Western.—Rusling & Fagan, of 137 Broadway, New York city, have the contract for grading the extension from Bernardsville to Peapack, N. J., 7½ miles.

Denver & Rio Grande.—The contracts are to be let next month for the narrow gauge branch from Villa Grove south through the San Louis Valley to Alamosa, Col., a distance of 54 miles. The entire line will be built on a tangent, and there will be no bridges, except a few short structures over irrigating canals. There will be no rock work, and the grading will be light, there being a light embankment for most of the distance.

Duluth & Winnipeg.—A large force is now grading on the section from La Prairie northwest to Lake Winnebagoshish, and it is stated that the track-laying will begin about June 15. The locating surveys are being made from the lake northwest for 20 miles and thence north to Red lake and the boundary line near the southwest point of the Lake of the Woods. Passenger and freight trains are running regularly between La Prairie and Duluth, Minn., the tracks of the St. Paul & Duluth being used between Cloquet and Duluth.

Dunderburg & Spiral.—Ripley & Coffin, of 50 Broadway, New York city, are the contractors for this road, which is to be built from Jones Point, N. Y., on the Hudson River, up Mount Dunderburg, in the Highlands, by two inclined planes at a grade of 1,510 ft. per mile, to an altitude of 1,200 ft., and thence by a circuitous route to be operated by gravity, back to Jones Point. The distance is 15 miles, and the maximum grades, exclusive of the incline, will be 90 ft. per mile. Stationary engines and cables will be used to operate the incline.

Elberton Air Line.—It is stated that the work of changing the line to standard gauge between Toccoa and Elberton, Ga., a distance of 51 miles, will be commenced some time next month.

Fort Worth & Denver City.—The bridge across the Trinity River on the extension from Hodge to the city of Ft. Worth, Tex., is now being rapidly erected, and it is expected that it will be completed by June 1 when the line will be opened for traffic. The freight station in Ft. Worth is also nearly finished.

Fort Worth & Rio Grande.—The grading on the extension is progressing rapidly, the work being com-

pleted to within 4½ miles of Comanche, Tex. It is believed that the trains will be running into Comanche by Aug. 1.

Georgia, Carolina & Northern.—A preliminary survey is now being run within the city limits of Atlanta, Ga. Two surveys have been made to the city, one entering it from the east and the other from the south. A surveying party is now working between Lawrenceville and Atlanta, and it expects to complete the survey for the section within two weeks.

The company has been enjoined from continuing the construction of its road near Athens, Ga., by some of the property owners, across whose land the company has not secured the right of way. This matter will doubtless soon be settled and the officers expect to have the tracklaying finished to the Savannah River before the end of the year. The road is now in operation to Fish Dam, about 20 miles beyond Chester.

Great Northern.—One of the engineers of the company recently stated that the road had several parties in the field between Spokane Falls, Wash., and Great Falls, Mont. One party is at work near the Cadott Pass, Mont., west of Great Falls, which, if used, would bring the road out at Missoula. The other parties are on the Marias Pass, in the Flathead lake country.

Great Northwest Central.—The ballasting is now in progress on the first section of 50 miles from Brandon, Man., on the Canadian Pacific. The tanks and station buildings are also being erected. About 150 men are engaged in this work. Three engines and part of the other rolling stock have arrived, and the company expects to have this section in operation by July 1. Work will soon be resumed on the second 50 miles, the contract for which has already been let to A. Charlebois, of Ottawa, Ont., and Brandon. The grading is light prairie work, with maximum grades of 60 ft. to the mile, and maximum curves of six degrees. The locating surveys have been completed for 150 miles from Brandon, and it is expected to complete the road for this distance the present season. The proposed northern terminus is at Battleford, a distance of 450 miles from Brandon. J. H. E. Secretan, of Brandon, is Chief Engineer.

Hamilton & Corydon.—This company was chartered in Pennsylvania recently to build a road from a point on the Allegheny & Kinzua road in Corydon township to a point on the Kinzua Valley road, near Kinzua Creek, in Hamilton township, McKean County. The length of the road is 12 miles. The capital stock is $120,000. S. S. Bullis, Olean, N. Y., is President.

Homer & Susquehanna.—The survey has already been commenced for this recently chartered Pennsylvania road, which is to extend from Homer to a point on the Susquehanna River near Cherry Tree, a distance of about 20 miles. J. M. Guthrie, of Indiana, Pa., is President.

Houston & Texas Central.—The construction work on the branch from Hutchins to Lancaster, Tex., five miles, has been again suspended on account of the delay in receiving cross-ties and rails.

Indiana Northern.—The preliminary survey, which is now in progress for this branch of the Lake Shore & Michigan Southern, is being made between Chesterton, Porter County, Ind., on the latter road, about 40 miles east of Chicago, eastward, through the counties of Porter, La Porte, St. Joseph, Elkhart, La Grange and Steuben to the east line of Indiana at a point westerly from the town of Fayette, in Fulton County, O. Fayette is the present western terminus of the Fayette branch of the Lake Shore & Michigan Southern, and will be the eastern terminus of the proposed road, the section in Ohio being built under the charter of the Toledo & Ohio Northern. One of the officers states that the road will undoubtedly be built at an early day. It will furnish a shorter line from Chicago to Toledo, and also to Detroit, than any of the present lines. John H. Baker, of Goshen, Ind., is President, and G. H. Kimball, of Cleveland, O., is Chief Engineer.

Joplin Belt.—Surveys are in progress for this narrow gauge road, which is to be built to connect Webb City, Carterville, Galena, Belleville, Lehigh, Carl Junction, Cox Diggings, Grand Falls and other towns and mining camps of the lead and zinc district, with Joplin, Mo. The entire length of the proposed road will be about 30 miles. S. C. Henderson, of Joplin, is president.

Kewaunee, Green Bay & Western.—It is stated that a new survey will be made shortly for the line from Green Bay or Ft. Howard where it will connect with the Green Bay, Winona & St. Paul road to Kewaunee, and probably also to Sturgeon Bay, Wis. W. J. Abrams, of Green Bay, is President.

Little Rock, Hot Springs & Paris.—The company was organized at Little Rock, Ark., this week to build one of the divisions of the proposed road from Little Rock and Hot Springs to Paris, Tex. The capital stock is $500,000. The following is the Board of Directors: Isaac Wolff, Z. Ward, J. R. Miller, James G. Fletcher and John D. Adams, of Little Rock; Hugh L. Brinkley, William P. Moore, John Overton, Jr., and Napoleon Hill, of Memphis, Tenn.; William J. Little and C. N. Rix, of Hot Springs, and D. H. Scott and James H. Johnson, of Paris.

Mexican Roads.—Reconnaissances have been completed for the line from Tula to Pachuca, of which General Berriozabal and Mr. Sebastian Camacho are the concessionaires. Construction will probably begin as soon as the plans have been approved by the Department of Public Works.

Middlesborough Belt.—About nine miles of the grading has been completed on this road, which is to be built from Cumberland avenue around Middlesborough, Ky., to connect with the coal and other mines near the town. Several miles of track have been laid.

Middletown & Hummelstown.—The entire grading between Middletown and Stoverdale, seven miles, has been completed, and some of the tracklaying has also been finished. The iron bridge across the Swatara River is being erected by the Pencoyd Iron Co., and Dean & Westbrook, of New York, are also building a bridge at Railroad street, in Hummelstown. John Rife, of Middletown, is President.

Milwaukee Traffic & Terminal.—This company has been organized at Milwaukee, Wis., to build a belt line about the city. The capital stock is $3,000,000. The incorporators are: John L. Mitchell, Capt. Pabst, Charles F. Pfister, Patrick Cudahy, A. K. Hamilton, and Michael Carpenter, of Milwaukee.

Montreal & Western.—Work is progressing on the 10 miles between Ste. Jerome and Shawbridge, Que., and the road will be ready for tracklaying between these points by July 1. The road is to extend to Le Desert, 70 miles from Ste. Jerome, and will be operated by the Canadian Pacific.

Napanee, Tamworth & Quebec.—This company has been granted permission to construct a branch line from Harrowsmith to Sydenham, Ont. The Kingston & Pembroke, which had applied for powers to build over the same route, has abandoned the project.

Nashville, Chattanooga & St. Louis.—The contract for the grading of the Pikeville extension from Dublin to Pikeville, Tenn., a distance of 20 miles, has been let to W. F. Foster & Creighton, of Nashville. The company will lay the track with its own forces. The first 10 miles is to be completed by Sept. 1 next, and the second section by Dec. 1. All the right of way has been secured and the contractors expect to begin work in a few days. The work is comparatively light, with maximum grades of 65 ft. per mile and maximum curves of six degrees. There will be one iron bridge about 200 ft. long. The company has not yet come to any definite decision regarding the completion of the Tennessee & Coosa road, but definite plans regarding the extension will doubtless soon be formulated.

Neville Island.—This road, which has been previously referred to, is to extend from a point on the Monongahela River opposite Pittsburgh and along the Ohio River to Bruno's Island, through Bruno's Island and to the main land, thence down the left bank of the Ohio River and across the river to Neville Island and along its south shore to its western end, and thence to the main land again at the Borough of Coraopolis. It is stated that the line will be built at once. The grades are light, with very few curves. There will be two iron bridges, each 600 ft. long. H. L. Christy, Yoder Law Building, Pittsburgh, is the representative of the company.

New Roads.—A second survey is being made from Livingston, Mont., on the Northern Pacific north along the Shields River to Castle. The surveying party of 14 men is in charge of G. O. Foss, who is acting under the instruction of an officer of the Northern Pacific.

A road is proposed between Fort Meade, on the Southern Florida, and Plant City, on the Florida Central & Peninsular, a distance of about 25 miles.

New York, Ontario & Western.—The directors have authorized the withdrawal from the trustees of about $830,000 of the bonds authorized for the extension from Hancock to the Carbondale coal region in Pennsylvania. The company has now about $2,100,000 bonds in the treasury, but these may not be issued for some time. The extension is longer than at first contemplated, and the cost has exceeded the original estimate by about $400,000. The rest of the proceeds from the bonds will be used for improvements on the main line.

Norfolk & Western.—Press dispatches state that negotiations are in progress between this company and the Ohio & Northwestern and the Cincinnati, Lebanon & Northern for a lease or consolidation of those lines with the Norfolk & Western. The Ohio & Northwestern extends from Cincinnati to Portsmouth, O., 106 miles, and if the negotiations are completed it will probably be extended to connect with the Ohio extension of the Norfolk & Western near Ceredo. The Cincinnati, Lebanon & Northern is a narrow gauge line and extends from Cincinnati to Dodd's, 36 miles.

Northern Indiana of St. Joseph County.—This company has been recently incorporated in Indiana to build a belt line connecting South Bend and Mishawaka in St. Joseph County. The length of the line will be about eight miles. The capital stock is $100,000. William Miller and John F. Clark are among the incorporators.

Ohio Valley.—The company has filed a mortgage in West Virginia to secure an issue of bonds amounting to $1,500,000 on the line from Bellaire to Marietta, O., about 84 miles. The road is an extension of the Cleveland & Pittsburgh, and is now under contract between Bellaire and Powhattan, 16 miles.

Omaha, Superior & Southwestern.—A survey is now being made from Superior, Neb., near the state line, southeast to Dodge City, Kan., a distance of 190 miles. The line is said to be projected in the interest of the Fremont, Elkhorn & Missouri Valley road, and grading will probably begin as soon as the locating surveys have been finished.

Oregon & Washington Territory.—The grading is now in progress near Centralia, Wash., on the Northern Pacific, for the division from that point west to Gray's Harbor, a distance of 57 miles. Most of the right of way for this line has been secured. The maximum grade is 26 ft. to the mile, the maximum curvature is five degrees. The grading is being done by George W. Hunt, of Portland, Or. The survey is now in progress for the proposed extension from Hunt's Junction, Wash., to Portland, Or., a distance of about 220 miles.

Oxford & New Glasgow.—It is expected to open this division of the Intercolonial System next month between Oxford and Brown's Point, near Pictou, N. S., 68 miles. The road extends through the towns of Pugwash, Wallace, Tatamagouche and River John. The ballasting is now in progress from Mingo Road to Oxford, 41 miles, the section between Mingo Road and Brown's Point, 28 miles, having been completed some time ago. Gray, McManus, Trites & Co., of Moncton, N. B., were the contractors for tracklaying and ballasting on the entire road. The contracts for the grading, bridge and culvert masonry, fencing, etc., upon the section between Mingo Road and Wallace, 18 miles, were let to Stewart & Jones, of Ottawa; for the grading, bridge and culvert masonry, upon the section from Wallace to Oxford, 20 miles, and for the construction (except buildings) of the section between Oxford and Oxford Junction, three miles, to McDonald & O'Brien; for the grading, bridge and culvert masonry, upon the Pugwash branch, from Pugwash Junction to Pugwash Harbor, four miles, to Donald Sutherland; for the grading, bridge and culvert masonry, from Pugwash Harbor to Pugwash, one mile, and the construction of the wharf at Pugwash, to McDougall & Giles. The Dominion Bridge Co. and A. Macpherson, of Oxford, built the bridges. R. H. Cushing is Engineer in charge of construction.

Paducah & Tennessee.—Grading has been commenced on the first section of 28 miles between Paducah and Benton, Ky. Five miles of the section is already graded. The subcontracts have not yet been let for the line between Benton and Paris, about 40 miles, but the awards will be made in a few days and construction work commenced. The Scranton Steel Co., of Scranton, Pa., has the order for 6,000 tons of rails, and the Tudor Iron Works, of St. Louis, for the track fastenings.

Parry Sound Colonization.—The contract is said to have been let to W. G. Reid, of Montreal, for completing the road from a point on the Northern Pacific & Junction road near Emsdale, westerly about 47 miles, to Parry Sound. The road has been surveyed, and the contractor expects to have 20 miles finished by the fall.

Pecos Valley.—W. C. Bradbury, of Denver, has received the contract for the grading, bridging and tracklaying from Pecos, Tex., north to Eddy, N. M., a distance of 90 miles. The work is to be completed by Dec. 25 next. Grading is to be commenced at once, and the rails have already being ordered and shipped. The preliminary survey has been made for the entire line and the locating survey has been completed for about 55 miles. On this section the grades will not exceed 40 ft. per mile, and the maximum curves will be 4 degrees. The road is being built by the Pecos Valley Irrigation & Investment Co., in connection with a system of irrigating canals. H. H. Cloud, of Pecos, Tex., is Chief Engineer.

Pennsylvania.—It is stated that 3,000 men are grading the Trenton cut-off road between Downingtown and Morrisville, Pa. It is expected to have the road completed from the Delaware River to Southampton within three months. The tracklaying will probably not be commenced until the entire road is graded and then the track will be laid from both Downingtown and Morrisville. A double track stone arch bridge has been built across the Wissahickon River. The tracks of the North Pennsylvania road will be crossed at Fort Washington, and a bridge will also be built over the Neshaniny Creek, near Langhorne. O. F. Keenan, of Freeport, Pa., has been awarded the contract for the grading on the Winifred Branch of the Southwestern Division from Junction on the Butler Branch to Winifred Furnace, 8½ miles. Charles F. King, of Greensburg, Pa., has the contract for grading the Little Sewickely Branch of the same division from a point on the Radebaugh Branch to Little Sewickley Creek, eight miles.

Phillips & Rangeley.—D. W. Brown & Bro. have been awarded the contract for the grading and tracklaying on this road between Phillips & Rangeley, Me., a distance of 28 miles. The contractors intend to put 400 men on the work at once and to complete the line to Reddington this season. The line will not be completed to Phillips until next year. The road will be of 2-ft. gauge. It is stated that the contract was let at $6,000 per mile.

Plate Run.—The articles of incorporation of this company were filed in Pennsylvania this week. It proposes to build a road 17 miles long from the head of Young Women's Creek, in Potter County, to North Bend, in Clinton County. The capital stock is $100,000. The directors are: James S. Weed, F. M. Weed and William Chill, of Binghamton, N. Y.; William H. Jessup, H. C. Jessup and George S. Jessup, of Montrose, and Horace E. Hand, of Scranton.

Pueblo & Duluth.—This company was incorporated in Nebraska this week to build a road from Covington, opposite Sioux City, Ia., southwesterly across the state, passing through the counties of Dakota, Dixon, Cedar, Wayne, Pierce, Madison, Antelope, Boone, Wheeler, Greeley, Valley, Harvard, Sherman, Custer, Buffalo, Dawson, Gosper, Frontier, Red Willow and Hitchcock. William A. Winant, William H. Caputt, Ralph A. Weill and R. W. Carman, of New York, are incorporators.

San de Fuca Ship Canal & Railroad.—Harlon & Mittall, of Seattle, Wash., have been awarded the contract for clearing the right of way for the canal from the Straits of San de Fuca across Whidby Island. The contract for the railroad system has not yet been let.

Seattle & Montana.—A good portion of the proposed line is now covered by locating parties. Two parties are working from the Seattle end of the line, and are now about 50 miles northeast of the city. One more party will be put on next week, and another the week following. In the early part of July five parties will be working from Seattle north, two in the Cascade Mountains and three west to Seattle. Seven surveying parties are now working west from the Rocky Mountains, and have nearly finished their work.

Sierra Mojada.—It is reported that construction on this line will begin soon. It is projected to extend from San Isidoro on the Mexican Central to Saltillo on the Mexican National. Samuel Lederer, of the City of Mexico, is interested.

Smithonia & Dunlap.—A meeting of the incorporators of this Georgia road will soon be held at Smithonia, Oglethorpe County, Ga., to decide upon the route for the extension to Sandy Cross and through Mallory-ville and Lincolnton to a connection in North Carolina with the Knoxville & Augusta, over which it is proposed to enter Augusta. The survey has already been made as far as Sandy Cross, and a line has also been run north to a connection with the surveyed route of the Georgia, Carolina & Northern near Athens. The road is controlled by James M. Smith.

Southern Pacific.—A survey is being made for a short branch of the Morgan's Louisiana & Texas road Lamorie, La., 14 miles south of Alexandria, west for a distance of about seven miles.

Toronto, Hamilton & Buffalo.—The company's agents are securing right of way in Hamilton, Ont., between Wentworth street and the cemetery. They estimate that the amount needed to purchase the necessary land will be much more than the $275,000 voted by the city, and in addition there is to be added the cost of building the tunnel, which is estimated at from $100,000 to $125,000, and the cost of the part of the Brantford branch lying in the city. An estimate made some months ago was about $220,000, but that was for a surface route. Owing to the construction of the tunnel from Bay to James street, the road will have to be sunk, and this will necessitate the purchase of a right of way sufficiently wide to make the slopes to the surface east of James street.

Troy & New England.—The company has filed a map of the route recently surveyed between Troy and Canaan, N. Y., in Rensselaer and Columbia counties. The road will begin in Troy, at the junction of Hill and Washington streets and thence down Fifth avenue along the Union road to Albia and Wynantskill villages, and to Averill Park, Nassau and Malden. Between Nassau and Malden there is a branch to Kinderhook about five miles long, connecting with the Kinderhook

& Hudson. From Malden the main line extends to Bayville and East Chatham, crossing the Lebanon Springs road between Chatham and Bayville. At East Chatham the road crosses the tracks of the Boston & Albany above grade, and to the State Line, connecting there with the Housatonic and Boston & Albany. The length of the road is about 40½ miles. The line is not difficult to build except a small portion out of Troy, which will require a short tunnel. Otherwise the grades and curvatures are comparatively easy. W. P. Warren, of Troy, is President.

Wabash.—A cross bill was filed in Chicago June 2 by the Chicago & Western Indiana in the matter of the Wabash Chicago terminal facilities. The Wabash secured an injunction last December restraining the Western Indiana from interfering with the Wabash in the operation of the Chicago & Western Indiana's line from Polk street, Chicago, to the Indiana state line near Hammond. The Wabash asserted that the Western Indiana threatened to terminate the lease held by the Wabash, being inspired thereto by roads competing for the business to and from Detroit. The cross bill of the Western Indiana prays that the lease to the Wabash may be cancelled, alleging that the Wabash has made arrangements with the Canadian Pacific by which the latter is enabled to enter the city over the leased tracks. This, it is alleged by the Western Indiana, is in violation of the inter-tenant contract by which the Wabash and various other roads use the tracks of the Western Indiana.

Washington Southern.—At a recent election in Grant District, Ritchie County, W. Va., the proposition to vote $15,000 to the capital stock of this company was defeated by a majority of 260.

Weatherford, Mineral Wells & Northwestern.—The contract for grading this line from Weatherford on the Texas & Pacific to Mineral Wells, Tex., a distance of 21 miles, has been awarded to Laing & Smook. The right of way has not yet been secured on some sections of the road, but as soon as this has been obtained the contractors will begin grading.

Wheeling & Lake Erie.—The construction of the extension from Portland, O., to Steubenville is proceeding very slowly on account of the high water in the Ohio River, which has greatly interfered with the work, as the branch follows the bank of the river very closely and piles have to be driven for much of the distance to support the roadbed.

The subscription of $100,000 which the company has asked of Wheeling, W. Va., for an extension to that point has been nearly all subscribed.

Wheeling, Wellsburg & State Line.—The county court of Brooke County, W. Va., has authorized the issuing of $50,000 of the county's bonds in accordance with the result of the recent election, the county voting that amount to the capital stock of this company. The company proposes to build from Wellsburg to Canonsburg, Pa., a distance of 30 miles, and thence to Pittsburgh.

Wilmington, Onslow & East Carolina.—The track laying has been completed on the first section of 10 miles from Wilmington toward Onslow, N. C. The company has asked the city of Wilmington to issue $25,000 of the bonds voted by the city for the road, but the authorities have declined to accede to the request until some disputed legal matters have been decided upon by the courts.

GENERAL RAILROAD NEWS.

Chicago & Northern Pacific.—This company, which is leased to the Wisconsin Central, has filed in Illinois a mortgage amounting to $30,000,000 in favor of the Farmers' Loan & Trust Co., of New York, which covers the first mortgage 50-year 5 per cent. bonds on the consolidated lines. The mortgage also covers and releases indebtedness held against the Chicago & Great Western, Bridgeport & South Chicago, and Chicago, Harlem & Batavia to the amount of $4,000,000, these lines forming part of the consolidated road.

Chicago, Rock Island & Pacific.—The company reports the following as the earnings and expenses for the year ending March 31:

	1890.	1889.	1888.
Gross earnings	$17,639,060	$12,841,029	$13,509,727
Oper. expen	12,475,067	9,127,198	8,742,659
Net earnings	$5,163,993	$3,713,831	$4,767,667
Other income:			
Cash land sales	$91,350	$130.000	$220,000
Int. from C., K. & N	1,202,640	1,416,442	
Premium on bonds	35,950	114,487	844.060
Prop. roads		682,498	193,170
Total net increase	$6,500,933	$6,057,258	$6,024,837
Total charges	4,605,154	4,377.667	2,428,566
Balance	$1,895,779	$1,679,589	$3.596.271
Dividend	1.846,228	2,653,824	3,010,566
Surplus	$49.551 Def.	$974.235 Sur.	$585,705

The gross and net earnings of 1890 includes the Western lines, other years as net, and in 1888 the Western lines earnings are for 21 months.

Grand Trunk.—The appeal of the company from the judgment of the lower courts, in the case of the suit of the city of Hamilton, Ont., to recover the amount of the subsidy voted the Hamilton & Northwestern has been decided in favor of the city and judgment given for $60,000 and interest. At the time of the voting of the subsidy it was made a condition that the road should be operated as an independent line for 21 years, and its consolidation with the Grand Trunk violates this agreement.

New York, Lake Erie & Western.—The earnings and expenses for April and the seven months to April 30, were as follows:

Month of April:

	1890.	1889.	Inc.
Gross earnings	$2.345,757	$1,053,733	$392,024
Operating expenses	1,566,244	1,329,237	237,007
	$779,513	$624,496	$155,017
Less proportion due leased lines	205,318	174,909	30,409
Net earnings	$574,195	$449,587	$124,608

Seven mon hs, Oct. 1 to April 30:

	1890.	1889.	Inc.
Gross earnings	$16.272,551	$14,666,808	$1,605.742
Operating expenses	10,740,854	9,655,559	1,085,295
	$5,531,697	$5,011,250	$520,447
Less proportion due leased lines	1,483,855	1,316,671	167,184
Net earnings	$4,047,842	$3,694,579	$353,263

Illinois Central.—The earnings from traffic, for the ten months ended April 30, 1890 and 1889 (April, 1890, estimated), were as follows:

	1890.	1889.	Increase.
Average Miles oper	2,275	2,081	194
Gross earnings	$12,250,460	$10,631,943	$1,618.517
Oper expen and taxes	7,892,140	6,656.394	1,235,746
Per impr. paid from income	216,528	213,242	3,286
Total	$8,108,668	$6,869,636	$1,239,032
Net earnings	4,141,792	3,762.307	379,485

The Dubuque & Sioux City reports its gross and net earnings for the ten months ended April 30, 1890 and 1889, as follows (April, 1890, estimated):

	D. & S. C.		C. F. & M.	
	1889-90.	1888-89.	1890.	1890.
Miles	524	524	76	76
Gross earning	$1,621,264	$1.482 110	$ 77,167	$80,867
Oper. expen. & taxes.	1,211,855	1,166,217	127,593	93,513
Net earnings	409,409	315,893	def. 50,426	def. 12,646

	Both roads.		
	1890.	1889.	Increase.
Miles	600	600	....
Gross earnings	$1,698,431	$1,562,977	$135,454
Oper. expen. & taxes	1,339,448	1,259,730	79.718
Net earnings	358,983	303,247	55,736

The Dubuque & Sioux City has also expended on permanent improvements $121,744, which has been charged to capital account. The amount so spent and charged for the corresponding period in 1888 and 1889 was $107,954.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The plan for consolidation of the Pittsburgh, Cincinnati & St. Louis, Chicago, St. Louis & Pittsburgh, Cincinnati & Richmond and Jefferson, Madison & Indianapolis roads was adopted by the Board of Directors of the several roads named, this week. The new name of the consolidated roads will be as above. The capital stock of the new company will be $75,000,000, of which $30,000,000 will be preferred, non-cumulative four per cent. stock, and $45,000,000 will be common stock, and the total issue of bonds to be authorized is $75,000,000. The outstanding stock and bonds of the old corporations will be called in, and $40,000,000 of the new stock and $40,000,000 of the new bonds will be issued in exchange for the old stock and securities. The remainder of the new stock and bonds will be retained in the treasury and will be issued as it may be needed for betterments, extensions, etc. Special meetings of the stockholders of the several roads will be held in about 60 days to ratify the plan of consolidation.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, June 4, 1890.

As briefly stated in my dispatch of last week, the Presidents of the Western lines resolved to end the passenger rate war by agreeing to restore all rates to the basis of Dec. 31, 1889. In accordance with this agreement, all the General Passenger Agents met May 29 and voted to restore rates on June 9, and notice of this action was at once sent to the Interstate Commerce Commission and to all agents. Thereupon the Alton notified the other lines that so long as the Wabash was allowed to pay street commissions on Niagara Falls business at St. Louis, it (the Alton) would insist on the same concession on Chicago business. The passenger men accordingly met on Monday to consider this matter, but were unable to dispose of it and left it for consideration at the meeting which had been called for yesterday to take steps toward the reorganization of the Western States Passenger Association. This meeting, however, served only to further complicate matters, and its only tangible result was the appointment of a committee consisting of J. F. Tucker (Chairman), W. H. Newman, C. H. Chappell, C. M. Hays, Geo. B. Harris and E. St. John, for the purpose of obtaining the signatures of the lines which have not as yet joined the new passenger association, and to recommend a person for permanent chairman. The outlook for the restoration of rates on June 9 is therefore decidedly "mixed."

Traffic Notes.

Mr. J. R. Sears has been appointed Superintendent of the Louisville Car Service Association.

The 15th regular meeting of the Board of Managers of the Interstate Commerce Railway Association will be held June 11.

The Union Pacific has made the rate on wheat from Oregon to Texas points 65 cents per 100 lbs., a considerable reduction from the former rate.

The Baltimore & Ohio Co.'s road over the Arthur Kill Bridge is doing considerable freight traffic. The interchange with the Lehigh Valley at Roselle, N. J., averages 25 cars per day.

The appointment of John N. Abbott, ex-Chairman of the Western States Passenger Association, as assistant to President Hill, of the Great Northern, gives much pleasure to his many friends, and is a good selection.

The Burlington wants to apply the 12½ cent cattle rate from Southwestern Missouri river points to all of its routes from those points. The other lines object, fearing that such action will result in a reduction of the cattle rate from Omaha. The question will come before the monthly meeting of the Western Freight Association June 10.

The Chicago Freight Committee of the Central Traffic Association, at a meeting on June 2, decided to reduce the rate on wheat, barley, rye and their products from the 25 cent basis to a 22½ cent basis, from Chicago to New York; effective June 9. The Lake Shore insisted that this was necessary and the chairman had to authorize the rate.

The Louisville, New Albany & Chicago, the Pennsylvania, and the Big Four have agreed to discontinue the fast train competition between Chicago and Cincinnati, and adopt uniform schedules taking effect June 1. Nine hours and fifteen minutes is the time agreed upon for day trains between the cities, and ten hours and forty minutes for night trains. The lengthening of time is in no case great, and some of the trains are not affected at all.

Notwithstanding reports to the contrary, it is evident that the Trunk lines are far from easy in regard to the sudden transfer of a considerable portion of the dressed beef trade to the Wabash (Canadian Pacific Dispatch) line. The Wabash, by claiming the three cent differential accorded the National Dispatch (Grand Trunk) line reduced the rate to 45 cents. The Central Traffic lines have now decided to meet the 45 cent rate. If the Wabash again applies the three cent differential, there is likely to be a lively war precipitated, unless the Trunk lines decide that they will allow the new line to take what business it can get at the low rate.

The Georgia railroad commissioners have submitted to the railroads of the state a proposed revised standard freight tariff, which makes a difference in the rate on every class for every five or ten miles. As it now stands the rate may be the same for three or four consecutive ten-mile stations. For example, the rate on lumber shipped 200 miles is the same for 210 or 220 miles. The idea is to grade the rate better, making a slight difference for consecutive stations. No reduction is proposed in the standard tariff, except in distances under 25 or 30 miles, the rates for these short hauls being, in some cases, considered too high. A small change is to be made in classification. Classes 6, A and B have the same rate throughout. All the articles in A and B are to be included in 6.

The Canadian Pacific is likely to have considerable difficulty in opening its passenger route to Chicago, June 15, as intended. The Wabash is able to handle the freight business by making all eastbound rates on its own responsibility, and delivering to the Canadian Pacific at Detroit, but the Grand Trunk, which enters Chicago over the same tracks (the Chicago & Western Indiana) as the Wabash, will object strongly to the Canadian Pacific trains being allowed to use the same road. Already steps have been taken by the Chicago & Western Indiana to restrain the Wabash from carrying out this contract with the Canadian Pacific, and to this end on Monday filed a cross bill to the injunction granted the Wabash in December last restraining the Western Indiana from interfering. In the cross bill the Chicago & Western Indiana prays that the lease to the Wabash may be cancelled on account of alleged violation of the inter-tenant contract in making the contract with the Canadian Pacific.

Chairman Midgley, of the Southwestern Division of the Western Freight Association, in his annual report, shows that the lines in his association have neglected to report traffic amounting to nearly a million dollars, which the rules of the association demand shall be reported. The total traffic embraced in the report (chiefly of the lines between Chicago and Kansas City and St. Louis and Kansas City), was for 1889, 3,215,769 tons, as against 1,554,210 tons in 1888, and the revenue was $11,291,665 in 1889, against $5,558,147 in 1888. The average earning per ton, excluding lumber, was $4.50 westbound, and $3.28 eastbound, an increase of 46 cents westbound and 8 cents eastbound; 40,394 cars of live stock were transported at an average rate of $25 a car; a decrease of $31 a car from 1888. Of the westbound tonnage 68 per cent. went via Kansas City; 20 per cent. via St. Joseph; 2 per cent. each via Atchison and Leavenworth and 7 per cent. via other junction points. Coal traffic filled the largest number of cars, 5,455; and there were 3,045 cars of beer.

The Trunk Line Passenger Committee has passed the following resolution as a reply to an inquiry from the Interstate Commerce Commission:

Resolved, That it was evidently not the purpose of the framers of the law to deprive the public of any form of reduced rate transportation which had been freely, openly and without discrimination in use prior to the passage of the act. The party rate tickets heretofore issued under the rules of this committee could not be used by ticket brokers or speculators to reduce the rates on single one-way tickets, so as to cause discrimination between individuals, and in the judgment of this committee their use not only proved a convenience to the public, but their withdrawal has had a tendency to decrease the volume of travel to the detriment of the revenues of the railway companies. The use of one-way party rates was discontinued by a majority of the lines in this committee in deference to the opinion expressed by the chairman of the Interstate Commerce Commission in memorandum filed March 27, 1889, but, in the judgment of this committee, the use of such rates should be restored, both in the interest of the public and of the railway companies.

Atchison Through Trains.

The Atchison, Topeka and Santa Fe road's new fast train between Chicago and San Francisco is known as the "Pacific limited No. 1," and leaves Chicago at 4 p. m., carrying through sleepers for San Francisco and for San Diego, via Los Angeles. The running time of this train between Chicago and the Pacific coast is now 24 hours shorter than heretofore. As the Atchison now controls the St. Louis & San Francisco the time from St. Louis is to be shortened also. Connection is made with the Atchison at Burton, Kan., near Wichita. The company will also run a fast through solid train from Chicago to Denver via Pueblo and Colorado Springs, and make the run between Chicago and Kansas City in 14½ hours, the fastest time yet made. Three through trains will run from St. Louis daily. The Colorado time from there will be shortened several hours, and closer connection will be made at El Paso for Mexican points.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, May 31, amounted to 51,350 tons, against 56,213 tons during the preceding week, a decrease of 4,863 tons, and against 38,409 tons during the corresponding week of 1889, an increase of 2,941 tons. The proportions carried by each road were:

	W'k to May 31.		W'k to May 24.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	4,839	9.4	6,127	10.8
Wabash	3,555	9.9	2,905	5.5
Lake Shore & Michigan South.	9,154	17.8	10,948	19.5
Pitts., Ft. Wayne & Chicago	6,062	11.8	6,252	11.1
Chicago, St. Louis & Pitts.	6,888	13.4	7,272	12.9
Baltimore & Ohio	4,408	8.6	4,745	8.4
Chicago & Grand Trunk	5,723	11 2	5,768	10 2
New York, Chic. & St. Louis	4,601	9.0	6,328	11.2
Chicago & Atlantic	6,130	11.9	5,868	10.4
Total	51,350	100.0	56,213	100.0

Of the above shipments 1,170 tons were flour, 25,824 tons grain, 2,266 tons millstuffs, 1,118 tons cured meats, 774 tons lard, 7,713 tons dressed beef, 1,561 tons butter, 1,897 tons hides, 293 tons wool and 5,588 tons lumber. The three Vanderbilt lines carried 36.2 per cent. of all the business, while the two Pennsylvania lines carried but 25.2 per cent.